Swedish University of Agricultural Sciences
Faculty of Natural Resources and Agricultural Sciences
Department of Urban and Rural Development
Unit of Environmental Communication

Tatevik Kirakosyan

Exploring the role of Integrated Water Resource Management in Lake Sevan, Armenia: A systemic approach.

Independent project/Degree project/Master's thesis • 30 hec • Level Advanced A2 E
Programme/education • Integrated Water Resource Management Master Program
Place of publication Uppsala, 2011

Exploring the role of Integrated Water Resource Management in Lake Sevan, Armenia: A systemic approach.

Tatevik Kirakosyan

Supervisor:	Professor Nadarajah Sriskandarajah, Swedish University of Agricultural Sciences, Department of Urban and Rural Development
Examiner:	Professor Tarla Peterson, Swedish University of Agricultural Sciences, Department of Urban and Rural Development

Credits: 30 hec
Level: Advanced A2 E
Course title: Master Thesis in Integrated Water Resource Management
Course code: EX0658
Programme/education: Integrated Water Resource Management

Place of publication: Uppsala
Year of publication: 2011
Picture Cover: Alexanyan
Online publication: http://stud.epsilon.slu.se

Key Words: Integrated Water Resource Management, Systems Thinking, Public participation, Common-pool resources.

Swedish University of Agricultural Sciences
Faculty of Natural Resources and Agricultural Sciences
Department of Urban and Rural Development
Unit of Environmental Communication

ACKNOWLEDGEMENTS

I would like to express my gratitude towards the many people and institutions that assisted and helped me in my work. My supervisor Professor **Nadarajah Sriskandarajah** is thanked, for his sincere approach to guide me through this process, **Gavar Aarhus Center** and all stakeholders who contributed in the workshops and discussions and the **Water Resources Management Agency** of RoA Ministry of Nature Protection that was the non-formal host institution of this project. This publication has been produced during my scholarship period at Swedish University of Agricultural Sciences, and I acknowledge with gratitude the **Swedish Institute** scholarship which supported the study.

Abstract

Lake Sevan is the biggest and the most important lake in the Republic of Armenia. It is a huge freshwater reserve and has a significant role in Armenia's socio-economic development. It is a source of low cost electricity and due to its high altitude provides irrigation waters for the lower located Ararat Valley and the agricultural lands in the region. It is also a habitat for both endemic and introduced species of freshwater fish.

Mismanagement of the natural resources of Lake Sevan basin threaten the sustainability of the lake ecosystem. In particular, the lowering of the lake level of 19 meters has initiated considerable changes that, if not controlled will become irreversible. Since 1962 measures were applied to raise the water level of the lake, which nevertheless did not result in the improvement of the situation. The situation calls for different approaches to be applied.

In addition the new integrated approach towards management of water resources used since the late 1999s has been ineffective for multiple reasons.

The study conducted in the Lake Sevan area, aimed to examine the extent to which Integrated Water Resource Management as a management concept has been applied, to understand the complexity of the situation and to propose desirable and feasible actions through the application of Soft Systems Methodology.

The study revealed issues that were of high concern among stakeholders involved in the Lake Sevan situation and was important for examining the level to which IWRM as a management concept has been applied. Two concerns were pursued further and desirable and feasible recommendations for improvement were suggested.

The study concludes that stakeholders viewed IWRM as a blueprint package and suggests that Soft Systems Methodology is able to support and ease the implementation of IWRM principles.

TABLE OF CONTENTS

1. Introduction

Integrated Water Resource Management is an important development in water management and the best practice so far to help countries address water related challenges posed by economic and social development. It presents an alternative to the fragmented view on the water resource utilization and development and underlies the Master's Program I studied.

This 30 ETS thesis is the outcome of a semester of study of a specific case in Armenia.

This chapter gives an explanation and description of the problem, raises the research question, mentions the main objectives to be achieved during the study and introduces the area of research.

1.1 Background to the problem

The problem of Lake Sevan is related to the use of its natural resources. It is a critical resource for Armenia and plays an important role not only for the region, but also for the whole country in a number of ways. It has an important economic value in terms of providing low cost energy considering its higher altitude above sea level and the opportunity to irrigate lower areas; freshwater fish; and is the most popular recreational area in the country since Armenia has no access to the sea. The Lake has a strategic significance for the country in terms of being a huge freshwater reserve.

Changes in the ecosystem mainly due to the water level fluctuations that were the outcome of the short sighted decisions during Soviet times have disturbed the ecosystem of the lake, such as: reduction of hypolimnium, increase of the water temperature, decrease of dissolved oxygen, growth of algae. The lake is currently in mezotrophic state and close to eutrophic[1].

To re-establish the lake's disturbed ecological balance a series of measures were taken since the 1960s with an initial aim to slow down and suspend the decrease of the water level by gradually raising current levels.

With combined raises and decreases from 1981-2001, the minimal level of the lake was observed in 2001 and was at the point of 1896.32 meters a.s.l.. In 2009 the water level was raised up 2.91 meters compared to its minimal level in 2001. It is now projected to raise the

[1] MNP, 2005,

lake's level until 1903.5 meters a.s.l.. This level is considered sufficient for reaching the ecological equilibrium state and for the creation of strategic reserves of drinkable water[2].

Though legal and institutional changes towards Integrated Management of Water Resources were underway beginning from 2001 and were aimed to ensure environmentally and economically vital use of water reserves in the country, approaches applied until now towards Lake Sevan did not solve the problem, but rather have created several additional challenges for managing the lake. Many forest, recreational areas, motorways became submerged and actions directed to escape those kinds of consequences were unsuccessful, although the government spent a huge amount of money on them.

It is becoming more evident that so called 'hard' approaches have failed to deliver positive results in this complex situation where the human factor plays a central role, and should be included in the understanding of the 'ecosystem'. So there is a need for other 'soft' oriented management approaches for tackling this complex environmental problem.

1.2 Problem statement and Research question

In this thesis the research is focused around the failure of the Integrated Water Resource Management approach to improve the situation in the Lake Sevan and to examine what approaches can improve the implementation of IWRM. The specific research question addressed in this thesis is:

"Why is implementation of Integrated Water Resource Management ineffective and how it can it be improved through application of a systems approach?"

To answer this question in this thesis Soft Systems Methodology was applied as a new way of dealing with the problem of the Lake Sevan.

1.3 Objectives of the thesis

The three objectives of the thesis are as follows:

- To examine the level to which IWRM as a management concept has been applied in Armenia in the Lake Sevan
- To understand the complexity as a step towards proposing desirable and feasible actions with engagement of stakeholders.
- To evaluate the relevance of SSM in Lake Sevan situation and learn its application experientially.

[2] NAS, 2010.

1.4. Delimitation

This study did not step into the implementation of the improvements that were agreed by stakeholders involved in the situation. This was due, firstly, to the time constraint to handle a cycle of discussions and debates that would have been required before any proposed change could be applied, and secondly, to the fact that the study was initiated by the student researcher who did not have the authority to pursue it further at this point. Also the page limit placed on this thesis restricted the volume of the work that would have required thorough descriptions and explanations.

1.5 Thesis structure

The structure of the work is derived from the objectives of the research and consists of the following chapters: *introduction* where background to the problem is given, the research area, and the research problem together with research question are presented, *theoretical framework* that presents the main concepts and approaches that were used and referred to in this thesis, *methodology in use*, where the researcher's way of methodology application is described, *findings* where the outcomes of the research are presented, *discussion* that takes up the outcomes of systemic analysis in the study and highlights the new understandings and insights gained, *conclusions* that tries to bring all lines together and reflects about research question and finally a chapter on *reflections* which contains the observations and thoughts of the analyst following the completion of the study.

The thesis also includes a section on *bibliography* and seven *appendices*.

1.6 Description of the study area

The Republic of Armenia is located in the South Caucasus. It is a highland country, with about 90% of its territory situated at an elevation of over 1000m and 40% over 2000m above sea level (a.s.l.) (Fig. 1)[3].

[3] G. Torosyan, 2007,

Figure 1. Geographic location of Lake Sevan

Source:[*http://www.bestpractices.at/main.php?page=programme/europe/best_practices/lake_sevan_armenia&lang=en*](http://www.bestpractices.at/main.php?page=programme/europe/best_practices/lake_sevan_armenia&lang=en)

Lake Sevan is in the central part of the Republic of Armenia, in the Geghama mountain chain, at an elevation of 1897n a.s.l. It plays also an important role in regulating water quantity in Armenia as well as in the Transcaucasian water balance[3].

The lake is comprised of two sections, Big Sevan (1032km^2, maximum depth 37,7m in 1934) and Small Sevan (384km^2, maximum depth 50,9m in 1934) (Fig. 2). The lake has strategic importance, both geographically and politically, and it provides a significant source of freshwater to the whole south Caucasus as well[4]

Thirty rivers discharge into the lake among which there are two major springs – Lchavan and Lichq. Four rivers discharge to the Small Sevan and, the rest to the Big Sevan[2].

The Lake is situated 60km to the North-East from Yerevan. Under natural conditions, Lake Sevan has been located at an altitude of 1916.2 m. a. s. with the surface 1416km^2 and volume 58.3 billion km^3(in 1934)[5].

[4] Nalbandyan et al., was accessed on-line 26.05.2011.

[5] Sargsyan, 2007,

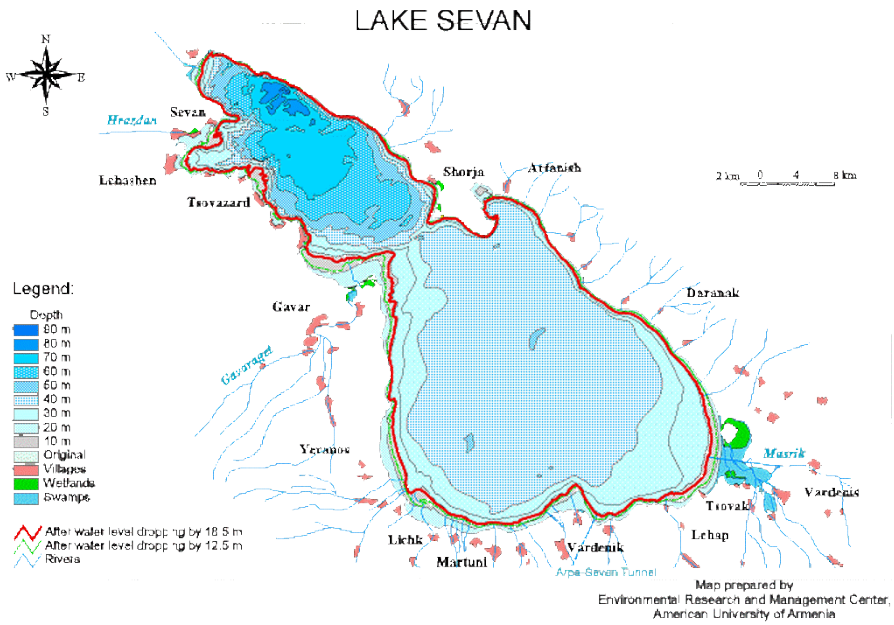


Figure 2. Big and Small Sevan with inflowing and out flowing rivers

Source: *http://armenianpages.com/ap-maps/armenia-sevan-water-level.htm*

Of the range of environmental problems in Armenia, the problem of Lake Sevan originated in the 1930s and still remains unresolved. The high location of the lake and the possibility to generate low cost electricity together with irrigating the Ararat Valley attracted engineers to find methods to exploit the water of the lake intensively[5].

Mismanagement and overexploitation of natural resources that often threaten the ecological potential of vast geographical areas are particularly apparent in newly independent states such as Armenia, where biosphere protection requirements have traditionally been neglected[6].

In the 1930s, a series of management decisions taken by the Soviet Government called for decreasing the lake's surface area, thereby reducing loss of water from evaporation and increasing the amount of water that could be taken each year (Fig. 3). Thus water was taken from lake for irrigation at rates substantially greater than the natural inflow, decreasing volume by 41% and lowering level by 19 meters over a period of approximately forty years[7].

[6] Hovhannisyan,. Gabrielyan, 2000,

[7] MNP, 1999.

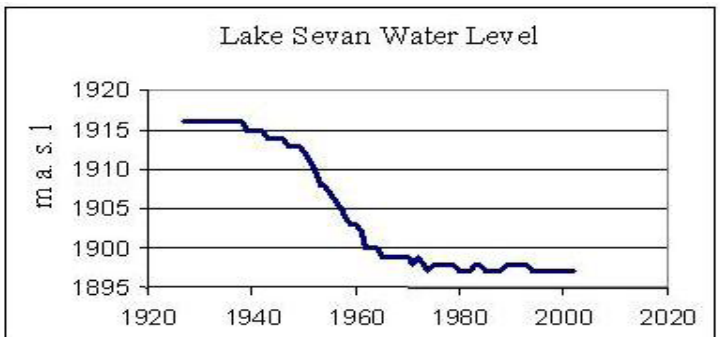


Figure 3. Fluctuations of the lake level (Nalbandyan et al).

On the River Hrazdan which is the main outlet of the lake, a hydroelectric system that is comprised of six hydropower stations with electricity capacity of 556 MW was developed. In addition, seventeen irrigation schemes were designed to distribute water to almost 100,000 hectares of agricultural land through gravity canals beginning below the various power stations in the system. Lake Sevan provides about 25% of the annual irrigation water for the region and about 12% of the water for Ararat Valley[7].

In 1962, when the water level had dropped by 15.7m, the "water bloom" phenomena were observed in Lake Sevan[3].

It also become apparent that the lake's capacity to provide a reserve for hydropower production and irrigation, as well as possible drinking water, was seriously threatened[7].

The Lake Sevan ecosystem is increasingly in a nonequilibrium state now, and the changes currently taking place within a 2-3-year time frame, would have taken from 50 to 120 years before the water level of the lake dropped by approximately 19m[3].

In order to raise the level of the lake the decision was made to use the waters of neighbouring watersheds. In 1962, a large complex construction was initiated to divert the Arpa River's flow to the lake. It was designed to supply some 250 million cu m/year of water to the lake. The Arpa-Sevan tunnel was put in commission in 1981[1].

After the Arpa-Sevan tunnel, the Vorotan-Sevan tunnel was constructed and put in commission in the end of 2004 to replenish water resources of the lake. These actions will give a possibility to additionally supply 165 million cu m of water/year to the lake[1].

In 1996, the Government initiated the development of an Action Program that would provide a framework for integrated management and a phased restoration of Lake Sevan[7].

In 2001 the National Assembly passed the Republic of Armenia Law "On Lake Sevan". The Law of the Republic of Armenia on Lake Sevan establishes legal and program framework of the state policy for restoration, reproduction, protection and use of natural resources of Lake

Sevan as of an ecosystem that has a strategic significance and economic, social, scientific, historical-cultural, esthetical, recreational and spiritual value for Republic of Armenia[8].

None of those actions led to problem solving, because of a fragmented view on the situation. Before the problem was in the drop of the water level and considerable amount of money and efforts were put in place to raise water level. Nowadays water level increase is seen partly due to applied hydro-technical measures and partly due to natural conditions.

Considerable areas are waterlogged, such as recreational areas previously built (most of them are illegal constructions), large artificial man-made forests will be in the near future under the water, motorways are submerged and secondary pollution takes place. Cleaning works were not done properly besides the considerable amount of money prescribed for it.

The situation became even more complex and uncertain and calls for urgent understanding of inefficiencies in water resource management and improvements before it will be too late and the Lake will turn into a swamp, which will imply a great loss for the country.

For the investigation of this task several approaches towards natural resource management are presented and discussed in this thesis. The following chapter presents the main theoretical concepts and understandings considered here.

[8] RA Law "On Lake Sevan", was accessed on-line 26.05.2011.

2. Theoretical Framework

This chapter describes the main theoretical approaches, concepts and understandings that are used to conduct the research and construct the arguments and discussions.

It first touches upon the concept of Integrated Water Resource Management, then walks through the themes of 'Systems Thinking' and particularly 'Soft' Systems thinking and finishes up by describing the two topics of 'Public Participation' and 'Illegal Fishing in fresh waters', which are connected to the two issues that emerged from the research.

2.1 The concept of IWRM

Although the concept of IWRM is highly challenged and criticised, it still remains the most popular and sound approach towards the sustainable management and development of water resources. Furthermore, it might be better to think of ways to support the implementation of IWRM principles and understandings and to create positive implementation practices, especially taking into account the idea that "IWRM should not be seen as blueprint". It leaves space for searching case specific ways to reach the desired goals of IWRM based on the appropriateness to the situation.

2.1.1 Definition and the background understandings

The concept of IWRM arose in part to help address the failure of traditional approaches to meet development goals without sacrificing environmental sustainability. It is not a brand new innovation, but rather an evolving tool for good water resource management because before its adoption in 1992 Earth Summit, much of its understandings were already being practiced[9].

The most popular definition is the one that was given by the promoters of the approach by Global Water Partnership[10]:

> *"IWRM is a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems".*

The concept is based on four main principles that were formulated in the International Conference of Water and the Environment in Dublin[10],1992 and attempt to integrate the four

[9] GWP, 2009.

[10] GWP, 2000.

main themes of sustainability being: environment, economics, social needs, and the role of women[11]:

> "Fresh water is a finite and vulnerable resource, essential to *sustain* life, development, and the environment…"
>
> "Water development and management should be based on a *participatory* approach, involving users, planners, and policy-makers at all levels…"
>
> "*Women* play a *central* part in the provision, management, and safeguarding of water…"
>
> "Water has an *economic* value in all its competing uses and should be recognized as an economic good…"

Although there is a growing recognition of the concept in the international community, the concept has never been unambiguously defined and does not fully answer the question of how it can be implemented by this giving raise of different interpretations by different people[12].

Maybe this is one of the reasons that the concept has received much criticism. It is argued that the definition is all-inclusive, even impressive, but has not any practical value in terms of its application and implementation to improve the existing practices[13].

Especially considering the inherent complexities in natural resource management, the concept cannot be applied for all environments, for all countries, so there should be parallel moves to develop other ideas which bring the same returns of equity, efficiency and sustainability[14].

2.1.2 IWRM is not a blueprint

While all criticism is true, IWRM should be viewed as a philosophy, a framework of understandings necessary to reach the sustainable management of water resources. It introduced the elements of decentralized democracy where the stakeholder participation in decision making plays a central role; it calls for development of social spaces where different stakeholders with often discrepant and contradictory views can somehow work together[15].

It is necessary to consider IWRM as a process rather than product, as specific set of understandings, guidelines that must be adjusted to the specific context of the country[16].

---

[11] Solanes, Gonzalez-Villarreal, GWP, 1999.

[12] Jønch-Clausen, Fugl,, 2001,

[13] Biswas, 2008,

[14] McDonnell, 2008,

[15] Cap-Net, GWP, UNDP, 2005.

[16] Mei Xie, WBI), 2006.

IWRM is not a blueprint that can be taken and be applied in any place in any circumstances. There are significant differences within countries that shape water resources challenges and possible solutions. Applying it as a blueprint – a checklist of actions, without considering specific contexts and associated problems, will not deliver concrete benefits[9].

There is evidence[17] that developing countries in implementing IWRM tend to take a rather narrow view of the philosophy and apply it exactly as a blue-print package that includes almost all basic principles and understandings of the concept, such as: reforming water legislation and policy, recognizing river basin as the appropriate unit of water and land resources planning and management, treating water as an economic good, participatory water resource management.

GWP toolbox was created to provide with instruments and case examples for the practitioners of this approach to be able to use it as reference in developing their own practices and adapt to their circumstances. Those instruments are representing the key IWRM change areas, namely enabling environment, institutional roles and management instruments[18].

2.1.3 The need to address the "soft" challenges

The challenge of IWRM is to be able to cope with uncertainties resulting from climate change and overall socio-economic conditions and try to address it, given that ecological systems are very complex and closely interrelated to various social systems[19].

Thus IWRM is not just managing physical resources; it is also about reforming human systems[18], it is a means to achieve the desired end state, the state which is more desired and probable than the present one[20].

Considering that at present the possibilities for truly integrated water resources management are limited by the ability to really represent the full dimensions of variables, interactions and complexity that come into play, IWRM needs new methodological approaches to support its implementation[14].

2.2. Systems thinking

'We understand only when we understand the question to which something is the answer'[21].

[17] Verma, 2007,

[18] GWP, 2004,

[19] Dewulf et al, 2005,

[20] Mitchell, 2006,

[21] Gadamer, 2001,

2.2.1. The nature and difference of 'systems approach'

Although in the history of thought there were some holistic thinkers such as Aristotle, Marx, Husserl, it was in 1950s that the holistic thinking was institutionalized, which makes explicit use of the concept of 'system' and is called 'systems thinking'[22].

It is different from other disciplines by bringing together a number of different streams of knowledge. 'Systems thinking' is a subject that can talk about other subjects; it is a meta-discipline whose subject matter can be applied within virtually any other discipline[23].

The difference between science and systems outlook is how they view the world, from what angle they approach to understand the world. In other words they see the two sides of the coin and those two sides actually form a coin, so they can act complementary to each other and can reveal two different insights of the problem studied. From a knowledge generation perspective this would be a great contribution.

Both science with its 'scientific approach' and systems with its 'systems approach' are meta-disciplines, by scientific approach assuming that that the world is ordered and regular and systems approach assuming that the world contains the structured wholes. Systems approach takes a broad view on the world by considering all aspects into account and concentrates on the interactions between different parts of the problem[23].

2.2.2 Underlying principles of 'systems' approach

System is an umbrella term covering a variety of ways of either viewing complex reality or designing approaches to deal with it[24].

The concept 'system' began to be elaborated when organizmic biologist Ludwig von Bertalanffy, interested in the organism as a whole, suggested that the ideas he and his colleagues had developed concerning organisms could be applied to whole of any kind. While giving the name 'system' to the abstract notion, Bartalanffy used it for the parts that exist in the real world[22].

But it is important to note that 'system' is an abstract notion and systems do not exist in the real world. They are the imaginations of its practitioners of the approach, their choice of viewing the issue.

---

[22] Checkland, Scholes, 2005,

[23] Checkland, 1986,

[24] Wilson, Morren, 1990,

System is a set of parts that from the observer's point of view are essential for achieving this or that goal, it is the observer who chooses those parts to study, so it is not to think that systems are real[24].

All systems approaches have common underlying principles. The first assumption is the '*holistic perspective'* that everything is or can be connected to everything else. Particular attention is paid to interconnections, how the parts that form a whole interact, interrelate and even control each other[24].

Contrary to 'holism' 'reductionism' that is specific for scientific method, is a reduction of the phenomena to simple, objective, causal relationships. Everything that is not comprehensive cannot be considered reductionism, rather linear, causal relationship best describes this understanding[25].

Since the 'whole' is formed from the parts that have some properties, it is evident that 'the whole' will not exhibit the same characteristics as its parts. So it should have characteristics that can be prescribed to the 'whole' and have meaning only for the 'whole'. These are so called '*emergent properties*' that occur if the parts of the whole interrelate and are connected to each other in way that exhibit new properties[22], consequently the whole cannot be considered as sum of its parts[24].

Not least important premise is the notion of '*transformation*'. Systems transform themselves continuously by changing inputs into outputs produced by the system[24].

The hierarchically organized whole, having emergent properties, may in principle be able to survive in a changing environment if it has processes of *communication* and *control* which would enable it to adapt in response to shocks from the environment[22].

It is noted that the notion of '*hierarchy*' of systems or sub-systems is the systems version of reductionism[24].

2.2.3 The boundary concept

One of the most important understandings of 'systems thinking' is the concept of boundary. Defining this allows the 'systems' approach to answer the questions arising from the comprehensive and inclusive view on the world. What is going to be a comprehensive view and to what extend we need to be inclusive, when is enough?

The important contribution towards the boundary concept made by C. West Churchman according to whom, the boundaries are social and personal constructs that define the limits of the

[25]Midgley, 2000,

knowledge to be considered and people who generate that knowledge, people who will have certain roles inside those boundaries[25].

In every understanding of the situation there is inevitable lack of comprehensiveness that justifies the continual need to 'sweep in' more information to understand the situation. But this sweep-in process should stop somewhere, and this is where the boundaries will be constructed and the boundary will determine how issues are seen and what actions will be taken.

While we cannot have full understanding, we can get 'greater' understanding of the situation, all this means that no view of the world can ever be comprehensive[25].

The boundary decides what is included within it and also decides what is excluded from it. That is to say that there will be always another boundary that will include what is excluded from the first one.

2.2.4 Systematic and Systemic

The understandings of 'systemic' and 'systematic' are both included in the systems approach. But they mean different things and the distinction is deemed important by soft systems thinkers.

Someone who pays attention to interconnections is said to be systemic, but if the recipe is followed in step-by-step manner, then it is to be systematic[26]. In human health, a condition is 'systemic' if it pervades the body as a whole[27].

2.2.5 Hard and Soft Systems Thinking: Main difference

Beginning in late 1960s, Peter Checkland and his co-workers, reacted against the thinking then prevalent systems engineering and operation research, and coined the terms 'hard' and 'soft' systems[26].

The most fundamental and crucial difference between those two ways of systems thinking is in the way those two approaches use the concept 'system' and what meaning they give to it.

Goal-oriented thinking, which is the feature of 'hard' approach, was found unhelpful when dealing with situations as the practitioners of the approach call 'messes'. And this unease resulted in epistemological shift, in a move away from goal-oriented thinking towards thinking in terms of learning. When in hard systems thinking 'systems' were regarded as 'real world entities', the primary skill shifted to one of being able to build and use systemic models, the ones

[26] Ison, 2008,

[27] Checkland, Scholes, 1999,

that do not exist in the real world, as epistemological devices to facilitate learning and change (Ison)[26].

Thus the major difference of those two systems approaches is that the process of inquiry into the world can itself be organized as a 'learning system', it is the shift of systemicity from the world to the process of inquiry to the world. The use of the word 'system' is not any longer applied to the world; it is instead applied to the process of our dealing with the world[22].

But in ill-defined situations objectives are unclear and that both what to do and how to do it were problematical. All problem situations have featured human beings in social roles trying to take purposeful action[22].

2.2.6 Methodology and Method: the LUMAS Model

Methodology properly considered is the 'logos of method', the principles of method. If a particular human problematic situation is described using those principles, in that situation methodology leads to 'methods'. Methods become techniques if they can guarantee particular results in particular situations[22].

SSM may exhibit the characteristics *as method* when it is used by particular users in particular situations which is best illustrated in the LUMAS model (fig.4):

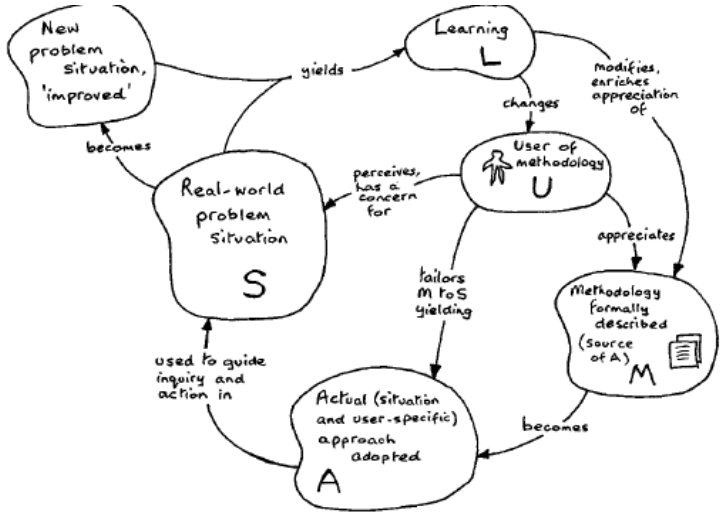


Figure 4 LUMAS model, *Source: Checklnad, 2005*[22]

The user (U) of the methodology appreciates it (M) as comprehensive, appropriate set of principles to be adopted for the perceived situation. Then specific approach (A) is tailored from the methodology for the improvement of the perceived situation. This approach is used to improve the situation (S). Therefore the use of the methodology generates learning (L) which generates also knowledge that can change the initial appreciation of the methodology[22].

2.2.7 Soft Systems Methodology

SSM is a methodology that aims to bring about improvement in area of social concern by involving people in a learning cycle which is ideally never-ending[27].

It was developed by Professor P. B. Checkland (Fig.5) at the University of Lancaster's Department of Systems. In essence, it is a process of inquiry with a number of distinct stages, passage through which is usually iterative rather than linear[28].

An inquiry begins, not with a 'problem' as such, but with a 'mess', or with an organizational setting in which someone thinks problems may reside. The basic idea is that every problem exists in a context, and that context may be perceived differently by different people[28].

From the seven stage model there are stages that are happening in the 'real world' and stages that happen in 'systems world'. The 'real world' stages stresses a people's involvement in the problem situation as necessary precondition, but in the stages that are happening in the 'systems world', it is the choice of an observer/practitioner of the approach to choose depending on the particular circumstances of the problem situation[23].

Stages 1 and 2 are 'expression' phase during which an attempt is made to build up the richest possible picture, not of 'the problem' but of the *situation* in which there is perceived to be a problem[23].

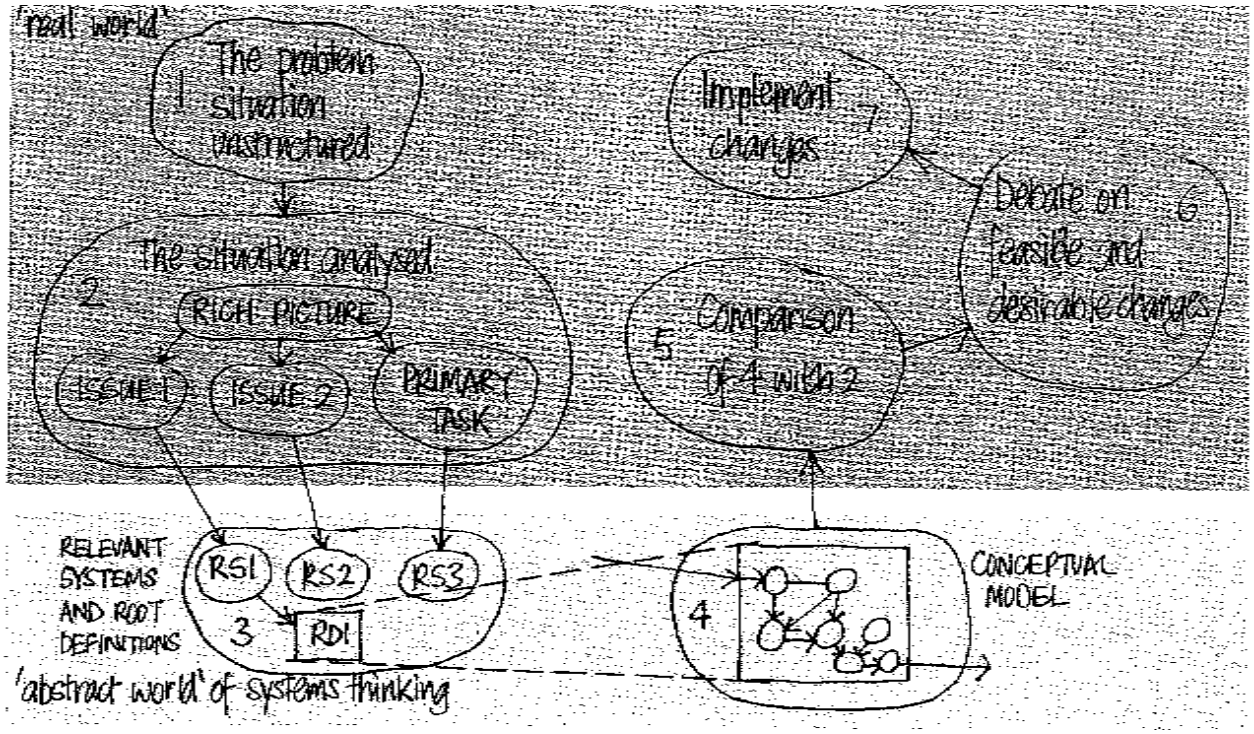


Figure 5. Methodology at a glance (Source: J. Naugthon, 1984)

[28] Naughton, 1984,

At the end of the second stage when the 'Rich Picture' is formed, the next step to take is to reflect upon it. While reflecting on the cartoon like picture, the analyst will try to identify some general patterns that appear from that picture. And this is where the stage three begins where the analyst steps into the 'systems' world.

Stage three is characterized by naming hypothetical systems, known as 'Relevant Systems' that are based on different Weltanschauungens- World Views, then the so called 'Relevant System' is described precisely in words, that is called 'Root Definition'[28].

The World Views are the perceptions of different actors that are necessarily involved in problem situation.After developing transformation statements at stage three, the Mnemonic CATWOE is used to complete the rest of the Root Definition.

The CATWOE emphasizes that each transformation needs people to carry it out (actors), has impacts on people (customers), will be influenced by powerful interests and decision makers (owners), will operate with various resources and constraints (environment), and will be subject to the owner's and other actor's view of the world (Weltenschauungen), which is implied in the groups's sense of transformation[24].

In stage four, the activity model is derived from the 'Root definition' and is called 'Conceptual Model', which contains all the essential activities which the notional system would logically have to perform. This abstract model is then, in stage 5, compared with what is perceived to exist in the actual problem situation[28].

The comparison stage is aimed to reveal new insights about the situation that were not considered before. As an outcome the Agenda of possible changes is developed which, in stage 6, is debated with the people who are involved in the problem situation. The purpose of the debate is to identify changes which are agreed by the participants to be both culturally feasible and systemically desirable. Those changes that survive the debate phase are then carried forward to the final stage for implementation.

2.3 Public participation in environmental decision making

Public participation is one of the main core understandings of IWRM that requires that stakeholders at all levels of the social structure have an impact on decisions at different levels of water management and is the only means to achieve long-lasting consensus and a common agreement[10].

But how participation in different parts of the world will happen and to what extent the particular type of it will be relevant, depends on the social, political and economic conditions in which such decisions take place.

As Arnstein (1969) notes[29]:

> "The idea of citizen participation is a little like eating spinach: no one is against it in principle because it is good for you. Participation of the governed in their government is, in theory, the cornerstone of democracy – a revered idea that is vigorously applauded by virtually everyone".

2.3.1 Citizen power and democratic philosophy

Participation has been thought of both in terms of power and in terms of democratic philosophy[30].

According to Arnstein going through the empty ritual of participation and having real power to affect the process outcomes are significantly different. She describes citizen participation as being a categorical term for citizen power and contends that it is the redistribution of power that enables those who are presently excluded from the decision making processes, to be deliberately included in the future. She divides the participation into eight rungs arranged in a ladder form that make up three levels of participation, with each rung corresponding to the extent of citizens' power in determining the end product[29.]

In general environmental management is highly dependent on the political commitment, the "will" that creates real change. Unfortunately it is very difficult to see the expression of that will especially in developing world.

Abelson et al (2003) stresses the importance and need for new approaches that emphasize decision-makers and the public two-way interaction, as well as deliberation among participants[31].

Theoretical basis for public participation lies largely with participatory democracy which means 'all acts of citizens that are intended to influence the behavior of those empowered to make the decisions'[32]

Green political philosophers such as Smith (2003) believe in deliberative democracy theories that promise political institutions that can deal better with environmental problems by promoting democratic deliberation and sensitiveness towards pluralities in values, due to the inability of contemporary liberal democratic institutions to encourage engagement and deal with plurality of values that human beings associate with the nature[33].

---

[29] Arnstein, 1969,

[30] Smith, McDonough, 2001,

[31] Abelson et al. 2003,

[32] James, Blamey, 1999,

[33] Smith, 2003,

While liberal democracy stresses the importance of voting and bargaining as social choice mechanisms, deliberative democracy stresses inclusiveness and dialogue, as a base to have more legitimate and trustworthy political authority[33].

Bingham (2008) describes dialogue as process in which 'participants engage in reasoned exchange of viewpoints, in an atmosphere of mutual respect and civility, in a neutral space with an effort to reach a better mutual understanding and sometimes even consensuses[34].

Along the same lines is to highlight that collective "problem-solving" as critical element of deliberation that allows different individuals to listen, understand, persuade and come up with informed and public-spirited decisions[31].

But because of the differences in values and perspectives, it will be very hard to achieve consensus in complex policy decisions. Therefore "mutual understanding" is the term that best describes deliberation[33].

There was a concern that challenged the ability of deliberative democracy to guarantee the inclusiveness of environmental values. While that might be true, all what deliberative democracy can guarantee is that values we associate with non-human world can at least be defended by opening up the political space for it. It is essential to view the deliberative democracy as 'desired ingredient' of democracy meaning that the understanding should be formed to know how to 'blend' it with other institutional structures[33].

2.3.2 Successful participation

There are different views and also critical views concerning the success of public participation in decision making, especially with regard to the environmental decisions and correspondingly the methods that are applied to achieve that success.

Some give higher priorities to the outcomes; others emphasize the process of participation as being more important.

Trying to judge 'good participation' in terms of the 'outcome' or 'process', the conclusion was made that "neither 'good' process nor 'good' outcome is sufficient by itself", there need to be a balance between those two[35].

Application of economic incentives and regulations can bring some success, but stakeholders are more likely to support policies if they understand the causes of the problem and the consequences of the policy decisions[36].

[34]Bingham, 2008,

[35]Chess, Purcell, 1999,

[36]Stave, 2002,

Environmental management situations often have no clearly "best" scientific or technical solutions. Traditional "decide-announce-defend" approaches that are highly employed where the idea of 'expert' is central who is able to make decisions on behalf of others and then tell people what is good for them, do not lead to long-lasting and widely supported policies[36].

Strong criticism flows from the viewpoint of R. Irvin (2004) who thinks that there is a lack of evidence that community participation in environmental management is effective, because of difficulty in measuring the success of environmental policies that may take decades to positively affect the environment. He emphasises the potential wastefulness of the process if it is employed in a less-than-ideal community. Citizen Participation may entail a significant expenditure of resources that could be used elsewhere to achieve better on-the-ground results[37].

The earliest and best-known advocate of deliberative democracy John Dryzek stresses the importance of deliberative institutions that are likely to be more 'ecologically rational' and having the ability to respond to the high levels of complexity, uncertainty and collective action problems associated with many environmental problems[33].

Deliberative features have been incorporated into a broad grouping of methods that include citizens' juries, planning cells, deliberative polling, consensus conferences and citizens' panels. Some of them more deliberative, others less (citizens' juries and planning cells do have deliberation as their defining feature, others like citizens' panels and deliberative polls close to traditional methods like surveys and opinion polls), but which one to use in particular situation depends strongly on the goals for participation[31].

While in the literature different forms and methods are emphasized and considered most useful, and different aspects are considered more important, there is no clear prescription what and where to apply. Therefore the crucial defining factor remains the case, special conditions where these 'good understandings' may work or be their application may be hindered.

2.4 Illegal Fishing in freshwaters as a common pool resource question

There may be some different causes why anglers conduct illegal fishing depending on the country and underlying conditions. But there are some characteristics found in other parts of the world that can be the same for any poaching activity.

[37]Irvin, Stansbory, 2004,

2.4.1 Theory of Common-pool resources as an attempt to predict outcomes

Most natural resource systems used by multiple individuals can be classified as common-pool resources. Common-pool resources generate finite quantities of resource units and one person's use subtracts form the quantity of resource units available for others[38].

For example the lake basin can be considered as a common-pool resource, and water, fish etc are the units derived from that resource.

When these units are harvested by one individual, the appropriations made by one individual are likely to create negative externalities for others. When the resource is renewable, like fisheries, open access to this common-pool resource generating highly valued resource units is likely to be overused and may even be destroyed if overuse destroys the stock or the facility generating the flow of resource units[38].

The conventional theory of common-pool resources is based on several assumptions that to some extent pose limitations on the applicability of this theory. The basic assumptions that have to be understood as given are the following: the resource units are highly predictable and finite; appropriators are homogenous in terms of their skills assets, cultural views and are short term, profit maximizing actors. According to this theory any-one can enter the resource and allocate and use its units given the open-access condition. The allocators then gain property rights only to those units that they harvested and can sell further in the market. The important precondition is also that they do not communicate or coordinate their activities in any way. This was the assumption that further made changes in applicability of the theory, because research has shown that there are many cases when allocators do communicate and make their arrangements to manage the common-pool resources, which is in more cases more effective than other arrangements made say from the government side[38].

For biological resources such as fisheries, cooperation among allocators is often essential to limit the rate of extraction and to sustain the regenerative power and stresses the compatibility of allocation rules to the physical and social conditions to be effective[39].

Along with these lines, the importance of formal and informal institutions was stressed by commons theorists also, as a means to influence the human behaviour, at the role of the latest in influencing human actions[40].

[38]Ostrom, 2000,

[39]Tang, 1991,

[40] Agrawal, 2003,

Therefore it is vital to mention not only the relevance of bureaucratic structures in the management of common-pool resources, but also consider the importance of non-bureaucratic alternatives[39].

2.4.2 Possible causes

In order to maintain the fish populations in balance and enable the reproduction, it is strictly important to keep sufficient numbers of larger-sized fish. But because fishermen are generally interested in catching those fish, the population balance usually can be kept only by regulations. The regulations applied vary from restrictions on gear, seasons to creel and size limits and are dependent on the situation, but the common one imposed on anglers is the minimum-size limit, which requires anglers to release fish below a specified size that they may otherwise have harvested[41].

But with increasing demands on freshwater fishery resources, even size limits may not adequately protect fish populations and even the best regulations will be inadequate if illegal harvest is too great[41].

Clark's model was suggested that with the existence of appropriate biological parameters enables to evaluate the effects of various levels of illegal harvest of sublegal-sized fish on the harvest of legal-sized fish. They argue that by having information on the level of illegal harvest, managers can direct enforcement efforts to areas where noncompliance has the greatest effect or prevents attainment of a management objective[41].

Further working on law enforcement measures and reducing the noncompliance with the regulations is the crucial aspect in the fighting against illegal fishing activities.

The central role in this activity belongs to human beings that have different views and expectations from the utilization of the natural resources. They are considered as the most dynamic components and have variety of direct and indirect effects on the fishery and want to acquire benefits from the resource.

One of the traditional responses in a poorly regulated fishery is for the fishers to move towards smaller meshed nets and to use illegal gears which exploit smaller sized fish[42].

According to the evidence important role play the market demands where the fish is exported. For example, in the case of Lake Victoria the processing factories attempting meet demands from the export markets that are demanding fillets from smaller fish because they are

[41]Larry, Taylor, 1990,

[42] Cowx, et al., 2003,

less fatty, were supplying smaller mesh sized nets to fishers tied into financial and supply agreements. Much of the very small fish caught was not recorded[42].

Failures attributed to state management and market-oriented policies have made community attractive to many policy makers as an alternative actor to govern forests, pastures, water and fisheries[40].

Considering that the fish resources are also important source of food for the locals, protecting the sustainability of the lakes become vital. Among the threats for the sustainability is considered the illegal fishing activity that is the reflection of the failure to integrate fishing communities in the management such as monitoring (data collection), control and surveillance of centralized management strategies[42].

The co-management practice is a bottom-up approach[43] that expected to implant greater sense of ownership, better utilization and more benefits, strongly depends on political commitment[42] and the commitment will require support by appropriate legislation and the provision of adequate technical and financial resources. Under co-management, new institutions would have to be developed and this will be a long lasting process.

Historical failure to include major stakeholders in decision-making is one of the causes of the current crisis in world fisheries and a weakness of the fisheries management process. As it is described in EC Green paper on the "Future of the Common Fisheries Policy"- any new management measure to succeed, fishers needed to be included in policy-making[44].

Maybe the trickiest and the most important aspect of illegal fishing activity is poorly paid fisheries staff. Those people are prone to corruption, and, instead of enforcing fishing regulations, they could collude with fishery offenders to continue their illegal practices, provided that they receive a percentage of the income earned from such practices[43].

[43]Njiru et al, 2008,

[44]Pita et al., 2010,

3. Methodology in Use

Whilest the overall methodology adopted in this study was drawn from Checkland's Soft Systems methodology, the methodology described here is the outcome of the application of soft systems theory in the problematic situation of the Lake Sevan in Armenia. As it is unfolded in the application process, particular characteristics and deviations of each stage are illustrated in detail.

3.1 Pre-study of the Research Project

In order to ease the conduct of the research and to minimize the risks some preoperational measures were undertaken prior to undertaking the field research. Particularly the Research Project Plan, Gantt chart of the project, SWOT analysis and used Mini Risk Assessment were developed. They are available in the Appendices of this paper.

Here follows more detailed explanations.

The Research project plan describes the seven stages of Soft Systems Methodology by introducing the milestones that each stage has to achieve and complete. Then for achieving each milestone there should be particular actions and should be time given for that. That is depicted in the Gantt chart, where it is evident that each stage begins when the previous stage ends. The time given for each stage was done by taking into account the work load that was prescribed for that particular stage. I should note also that there is another factor also influencing the length of the first two stages. Because the first two stages are very important for the development of the entire picture of the situation, there was more time given to be able to describe the situation more fully and analyze it as a whole.

The other pre-study tools used were SWOT analysis and Mini Risk Assessment. The aim of applying these tools was to identify and try to deal with the risks that might occur during the implementation of Soft Systems Methodology. SWOT analysis enabled to see the Strengths, Opportunities, Weaknesses and Threats that might ease and/or constrain the implementation of the Methodology.

Then the Weaknesses and Threats were analyzed and were given values to see the urgency to deal with those tasks if they occur. There were two risks that had the highest value and considered to be the most difficult and crucial risks in my project, because if they have occurred, they would have changed the whole project flow. They were: "Difficulty in gathering people for

the meetings" and "Stakeholder's willingness to spend time on my project". In case happened, I would have to have created alternative strategies for proceeding with my work further.

3.2 Seven stage process

Although the Checkland's model has seven stages, but for the sake of this research they have been followed until the stage seven. This had its reasons. In my view, stage seven needs more commitment from the stakeholders' side and can be viewed as another cycle of discussions, or even be followed as another seven stage process.

3.2.1 Problem situation unstructured

The first thing to do was to have a clear understanding of who would be the key stakeholders in the problem situation. To look at the situation as open as possible it is therefore wise to call the situation "problematic situation" rather than stating only the "problem" which is going to be "unstructured".

This also means that the analyst should enter the situation in an unbiased way. It is the perceptions and understandings of those who are in the situation that are important. Though, from this moment the analyst is no longer detached from the situation, rather he or she is a change agent, who changes the situation by intervention.

This is particularly very important aspect for the practitioner of the Methodology to have in mind. It is very difficult for especially the one who is a beginner in practicing this Methodology to resist the temptation to intervene by having prior biases, to stay as neutral as possible, but at the same time to be able to see the situation as a whole, from "outside". This is especially challenging when you are familiar with the situation or to some extent it also concerning yourself as citizen apart from being a "facilitator".

To think about and identify key stakeholders, the mnemonic CATWOE was used as a tool to think of possible actors, beneficiaries, victims, owners etc in the situation. After having the possible list, a Venn diagram was developed in order to place them according to their power and influence. This diagram was later consulted with stakeholders during the interviews and the first meeting with the Lake Sevan community. After stakeholder analysis some administrative arrangements and appointments were made for the interviews. Knowing a priori the culture and understandings of people the decision was made to not use the tape recorder. The interviews were recorded manually without including another person. The key organizations from where in total twelve interviews are listed in the Table 1:

Table 1. The list of main organizations that took part in the study

N	Name of the Organization	Number of people interviewed
1.	Water Resources Management Agency of Ministry of Nature Protection of Republic of Armenia,	2
2.	Sevan-Hrazdan Territorial Water Basin Management Division of WRMA,	2
3.	Coordinating Division of Basin Management Authorities,	1
4.	Water Cadastre Division of WRMA,	1
5.	Water Policy and Analysis Division of WRMA,	1
6.	Department of Environmental Protection of MNP, a UNFCCC National Focal point,	1
7.	State Committee of Water Systems of Ministry of Territorial Administration,	1
8.	Institute of Hydroecology and Ichthyology of National Academy of Sciences,	1
9.	Ministry of Agriculture	1
10.	Gavar Aarhus Center	1

There were some institutional changes happening at that time. The Policy and Analysis Division has been dissolved; the Sevan-Hrazdan BMO was divided into two BMO's – Sevan BMO and Hrazdan BMO. The interviewees chosen from these divisions were still valuable in terms of their ability to provide information about the problem, since they were working there long time.

'Snow ball' technique was also used to identify other possible interviewees.

When conducting the interviews I allowed the flow of the discussion to emerge, which led to more of a dialogic model than a traditional interview model. I had in my mind the themes that I intended to talk about, but tried to avoid to simply asking directive questions. I tried to ask more open-ended questions that allowed me to hear views and opinions and create a bigger and clearer picture of Lake Sevan situation.

As an opening the question 'whether the interviewee considers the situation problematic' was asked. This was done to identify different Worldviews of the interviewees which is among the most important aspects of Soft Systems Methodology.

The main big event of the first stage was the meeting/workshop with the local community of Lake Sevan basin that was organized with the assistance of Gavar Aarhus Center. Overall twenty people were present (See Appendix 5).

Mainly representatives from different active environmental NGOs, teachers from schools and high school students were present. They could represent also the view of ordinary people like fishermen, because it is the main income generating activity in the region and there were at least couple of people who were coming from fishermen family and were familiar with the challenges that they face.

Though the number of people gathered was big (20 people), it was possible to manage them. Suggestion was made to work as focus groups. That technique is used to initiate more participatory discussion among participants because they all will have a chance to express themselves. Focus groups also allow approaching the discussed question more constructively by creating the platforms for the flow of discussion and thus can generate better outcomes. They chose to work as one big group.

The creation of relaxed atmosphere and the development of trust for the generation of better outcomes were important aspects during the meeting.

During the meeting the Venn diagram, previously developed and discussed also with other stakeholders, was discussed and some additions and corrections were made (See Appendix 5).

The other useful tool, that was used to help them to identify and classify the issues of concern, was the Problem Tree Analysis. Participants were involved in the development of the Problem Tree (See Appendix 5). This tool enabled participants to try to differentiate causes from consequences, thus enabling them to construct their thinking and being able better formulate the problems that were not formerly seen problems as such.

At the end of the meeting with the community, the Questionnaire also was distributed (See Appendices 5) that contained only open-ended questions and aimed to capture views that some of the participants were not able to or hadn't a chance to voice.

The important question of this stage was: "Whether I heard enough? Or there are aspects that I should hear still? " . To my opinion, this is very important to have in mind, because one can interview unlimited people and hear a lot of different views and opinions, but it is important to know when to stop. Here comes the important aspect of soft systems approach - the boundary. It is the boundary that will decide how much of knowledge and how many people will be involved in the situation analysis.

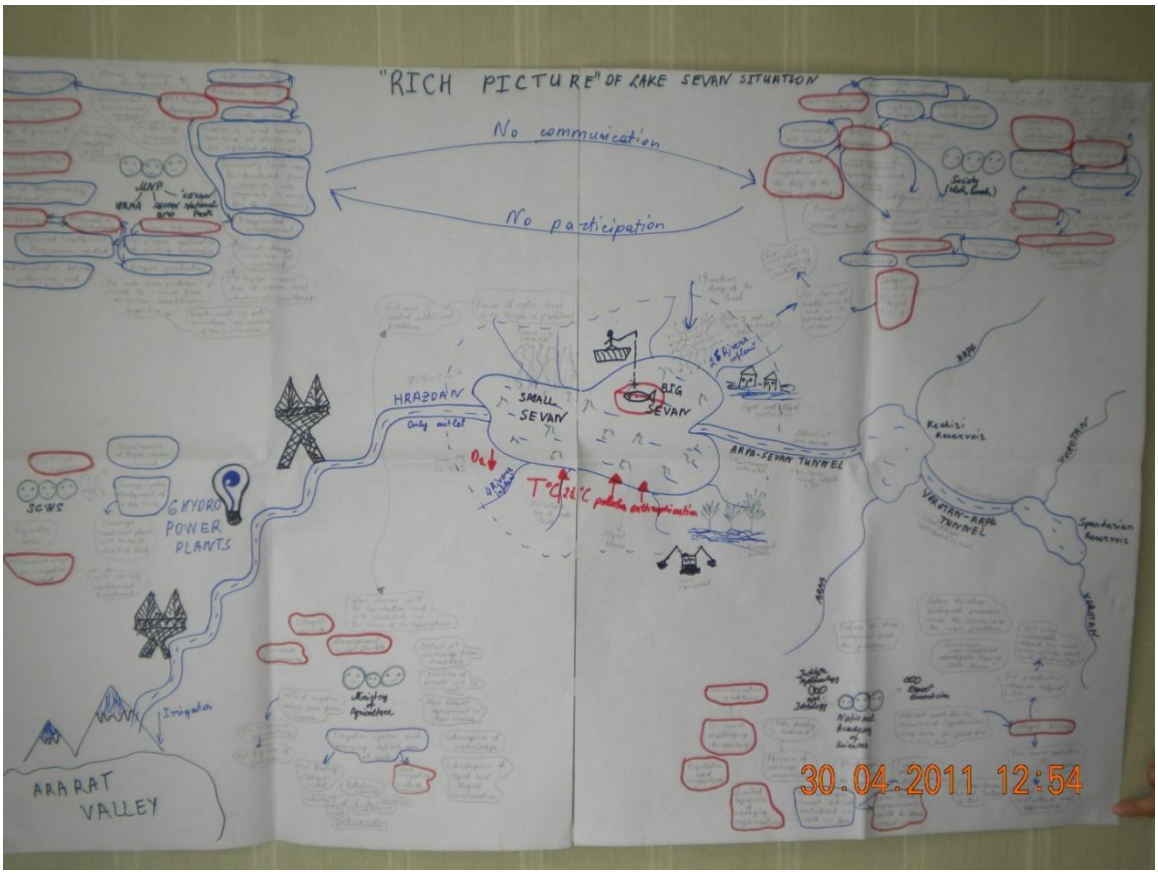
It is the task of the analyst to decide whether the situation is described as comprehensive as possible and whether the information gained is enough to have a richest possible picture

3.2.2 Rich Pictures, Issues and Primary Tasks

SSM is concerned with from finding out about a problem situation to taking action to improve it, and the idea is to get from finding to action by doing some systems thinking about the situation and representing it in all its complexity. And that cartoon like representation that summarizes all what we know about the situation is called Rich Picture the information contained in this picture is of two types: 'hard' and 'soft'. So called 'hard' information represents the factual data – departments, organizational structures, individuals etc. And so called 'soft' information are the subjective interpretations – views, opinions, guesses, perception and sometimes even gossips. So the existence of these two types of information together with the cartoons makes the picture really rich[28].

The second stage began by putting together all the interviews, transcribing the meeting results, and developing the Rich Picture. The Rich picture contains factual data, technical solution given different times to the problem, main problems, main players, their views, perceptions and the interaction between those organizations.

The Rich Picture was developed in one poster, but because it looked a bit 'messy' and may have created problems during the presentation to the wider audience during the second workshop that happened at the end of this stage, it was transformed into the bigger and well distinguishable one.



Picture 1. The Rich Picture of Lake Sevan problem situation

After having put all the information together, the analysis of the Rich Picture began. While reflecting upon the Rich picture the analyst looks for primary tasks and issues. Primary Tasks are the tasks in question which the organization in question was created to perform. Issues are topics which are of concern, or which are the subject of dispute[28].

The analysis revealed a wide range of issues, most of them being hierarchically dependent and caused from each other as Figure 6 illustrates:

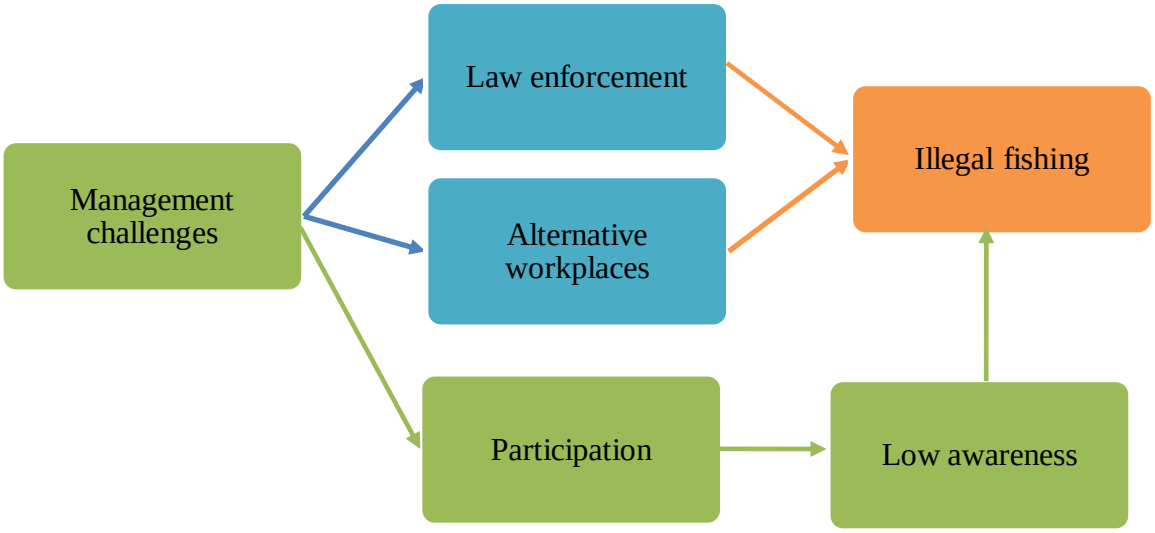


Figure 6. The six main issues identified in the study arranged in hierarchical order

Those issues appear in colure bubbles in the Rich picture.

The main activity of the second stage was the big workshop that was organized to gather all stakeholders together and to present the results in a form of a Rich Picture and to initiate discussion about the main issues emerging from the Rich picture.

The second workshop was organized in cooperation with Gavar Aarhus Center a month after the first one (See Appendix 6). There were 25 participants representing a variety of organizations such as: Coordinating Division of Water Basin Management Organizations of Ministry Water Resources Management Agency of Ministry of Nature Protection, Sevan Territorial Water Basin Management Division of Water Resources Management Agency, Ministry of Agriculture, Former Head of Department of Environmental Protection of MNP, a UNFCCC National Focal point, Division of Environmental Protection of Gegharkunik County, Lake Sevan National Park, Regional Environmental Inspectorate, Gavar Aarhus Center, National

Academy of Sciences, Institute of Hydroecology and Ichthyology and members from the different regional NGO's.

It was a very productive and at the same time very complicated meeting which outcomes will be discussed in the Discussion section of this paper.

The six issues and the Rich Picture were presented and the floor was left for the relevance and the urgency discussion of the presented issues. Two of them were given higher attention and discussion was concentrated mainly on them (See Appendix 6).

There was the intention to form a Working Group from the beginning which would have been working on the chosen issues in the preceding stages of the Methodology. Taking into consideration the flow of the discussion and the readiness and interest of people present, the decision was made by me to continue further stages by individual consultations.

Both meetings were following by the possible extent involvement of participants.

The results of the two workshops were published in the official web-page of Aarhus Convention in Armenia. They can be accessed following these links:

First workshop:

http://aarhus.am/blanks/news_info.php?news_id=1080

Second workshop:

http://aarhus.am/blanks/news_info.php?news_id=1164

3.2.3 Relevant Systems and their Root Definitions

Having unstructured and represented the situation pictorially, and reflected upon it at some length, the next task was to devise a systemic way of viewing it. This is accomplished in SSM by imagining and naming what in the jargon of the approach is called Relevant System. The relevance of the systems is assigned when it is relevant to the problem situation in the sense that exploring and describing it will yield insights into the situation. It is called *Human Activity System* – system whose elements are human activities and is an entirely abstract idea.

This means that the system and its activities do not exist in the real world and are abstract ideas that are depicted and presented in some way to enable to suggest improvements to the problem situation. Those suggestions may be regarded as irrelevant in the later stages by stakeholders with whom in the later stages they will be debated.

It is not possible to know whether a particular system was 'relevant' until you have gone through the analysis and seen whether the problem situation was improved as a result[28].

Because at the debating of the Rich Picture more attention was paid to the two issues and more discussion flowed on them, it was evident that those issues may be considered relevant by

the participants and may be the ones I need to proceed working on through the rest of the stages of the Methodology.

If we look at the Fig. 6 it is evident that those mentioned issues that are of concern all are situated in a hierarchical order and dependent on each other, with one issue contributing to or exaggerating the other. All the five issue are dependent or are the outcomes of the one biggest issue which is the poor management practices in the situation. And this was mentioned almost by every respondent during informal discussions and interviews.

My choice to work with 'Illegal fishing' and 'Participation' issues has several grounds. First, it would not make sense in my work to work with the 'poor management practices', because the issue is too broad and has many causes, it would take a lot of time to tackle this issue, and second, which is more important for me, is the fact that these kind of issues are 'untouchable' for the independent person working without a big support and it seemed too transparent for me. It would not yield, even when studied, new outcomes, new ideas etc. The same was with the 'Law enforcement' and 'Alternative workplaces', but rather 'Illegal fishing' is the issue that is the outcome of all the issues mentioned and from my research point of view tackling that problem would yield good outcomes. Besides it was a 'weak point' of locals and needs new and urgent improvements.

'Participation' issue is also enforcing the 'Illegal fishing' and is connected also with the 'poor management', but it is also not based in well developed grounds. So any idea for improvement may force the system start working. This issue also seemed interesting, for the sake of my research, in terms of its possible outcomes.

But before choosing them, few more interviews were conducted to clarify the picture. Key persons were chosen from different stakeholder groups for either face to face or by phone and internet interviews.

The outcomes of those discussions proved the relevance of working on the issues identified previously. Those issues were Stakeholder Participation and Illegal Fishing.

Further work for this stage was to name Relevant Systems in words that are called Root definitions and apply the CATWOE checklist in order to ask searching questions about drafted Root definitions. Root definitions and CATWOE checklist are presented in the Findings section of this paper.

In other words CATWOE checklist aims to expand the Root Definition previously developed and to add the missing parts of it.

This stage was passed by me without the involvement and consultations with stakeholders.

3.2.4 Conceptual Model Building

This stage of the methodology requires that the analyst leave behind the real world and moves into the conceptual or abstract world of ideas. Imagined 'would be' systems are conceived and modelled whereby you have to describe not just what the system is, but also what it does.

This is done by building an activity model of the system – a model of the activities or processes which, logically, must go on if the system is to be the one described in the Root Definition. The model you build is called Conceptual Model in the terminology of the approach and will be in a graphical form[28].

During the process of model building there is one important consideration that the analyst should have in mind. The model is constructed in terms of '*whats*' – activities specifying what, logically, must go on in the defined system. But the model should not be concerned with, or specific about, *how* these logically required activities should be carried out. 'Whats' are general and belong to the world of abstraction. 'Hows' are specific, real-world ways of carrying out 'whats'[28].

To develop the conceptual models in my view one has to have some background knowledge about the issues in concern. We are not proficient in everything and need assistance. Two options were possible; first one was to develop the model in consultation with stakeholders, the second one was to dig into the existing literature. Both were used.

The system has sub-systems that are human activities that enable the system to function as such and achieve its desired and feasible changes. It has also the entities that enable the system to survive in the changing environment and evaluation criteria's. The boundary of the system is open so that it can communicate information with the environment and be responsive and adaptive.

3.2.5 Comparison of Conceptual Model with reality

In this stage the analyst leaves the abstract world and brings the Relevant System(s) to the real world where the model is compared with the real world. In doing so the analyst expects to find similarities and differences, some of the processes will happen to go on in the real world and there will be a lot of differences and processes that do not exist in the real world for some reasons.

There are several techniques of how to do the comparison that were developed by the soft systems practitioners, such as general discussion, question-generation, overlay and historical reconstruction techniques[24].

The question-generation technique was used, which is in my view easy to present to the stakeholders because of its form. It asks ordered questions about the reality of problematical

situation. Listing those questions in the table allows translating the conceptual model into the language of existing reality and is a useful tool to initiating a discussion.

This table was used as a tool for both comparison and debate of the desirability and feasibility of the activities listed. So in this respect in my work the two stages - comparison and the debate were merged in terms of having one table for discussion. Comparison was done by the participation of some key stakeholders.

The reason to include the debate of the desirability and feasibility into one table was based on the considerations of the stakeholders' availability and the time constraint that I had for my work. In that form the table was easily discussed in terms of two aspects.

3.2.6 Debate with people involved in the situation

The purpose of this stage is to conduct a structured discussion with the actors about the ideas which are now starting to emerge from the analysis. The device used to structure the debate is the Agenda. Proposed changes should be both systemically desirable and culturally feasible. Only those changes that satisfy both requirements should be considered for the further implementation[28].

Systemic desirability means that any change to be implemented must make sense in systems terms: it must not violate, contradict, or run counter to the systems thinking that has gone into the formulation of the Root Definition and the construction of the Conceptual Model. Cultural feasibility asks whether a particular change is feasible for the particular set of actors involved[28].

As was noticed above the Conceptual Model developed for comparison included also the aspect of desirability and feasibility for the purposes of the initiating and constructing debate. Appointments were made with some key stakeholders and discussions were undertaken with them. There were both individual and group discussions according to the availability of stakeholders.

Action Plans were developed and so called "hows" proposed for implementation. These Action Plans are also subject for discussion if they are to pass the implementation phase and be implemented in the future. Action Plan for "Participation" issue was sent for comments and was commented.

The situation was completed until the stage six, the seventh stage was not considered for this research work given the time constraint. It took three months to handle this research and the main milestones were achieved. The outcomes in the form of Comparison Tables and Action Plans will be presented in the Findings section of this paper.

4. Findings

In this section the systemic analysis of the two main issues - participation and illegal fishing are presented in detail. These two issues were taken further through the stages of Soft Systems Methodology and the outcomes from that passage are presented.

4.1 Walking through the "Rich Picture"

The Rich picture (see Pic. 1) that was developed contains the analyst's construction of the whole and complexity of the situation as understood by her and shared with the stakeholders. It tries to incorporate all the complexity of the situation and sweep-in as much possible as possible in order to be able to take a comprehensive view on it. The picture is reached, because it contains different types of information sometimes described in words, sometimes described by cartoon that say much more than many words can do. I tried to follow the structure, process and climate version that is popular in SSM, but encountered some complications in terms of expressing those features.

So called 'hard' information is depicted that was described earlier in this paper, which stands for the data, facts, organizations, actors, technical 'solutions' to this problem, variations in level of the lake, urgent and blinking environmental problems, such as eutorphication, submerged recreational constructions and forests, the hydropower plants situated in the main outcome from the lake etc.

Perceptions, values incorporated in thoughts form the 'soft' side of the picture that is described in words mainly. Then the attempt was made to depict interrelations. The interesting aspect was to see that the actors are not communicating with each other or the level of communication is very low. But this issue was more evident between the main managing authority which is the Ministry of Nature Protection and the Society. There were no communication from the ministry side and further no participation from the community side.

Sitting back for a while a reflecting upon the 'Rich Picture' that was developed, there were six themes that started to be shaped (Fig. 6). These themes are highlighted by different colored bubbles in the picture. This chapter further describes in detail the six themes and the views that were the base for the formulation of those themes.

For the most of the interviewees the Lake Sevan situation was considered problematic, though there were also ones for whom it did not constitute and cannot be described as 'problem'. The most mentioned theme almost by all stakeholders was the issue of 'Management'. They described the presence of this issue by the following expressions: not proper management practices, fragmented management, not flexible management, bad management, climate change

is not considered, uneducated decisions, control and inspection are the responsibility of main organization, short-sighted decisions etc.

Other theme that was appearing quite bold was the issue of 'Participation'. The concern of not being involved by any means in decision-making was mainly alarmed by the local representatives, though the governing authorities also did not reject the existence of this problem and emphasized its vital importance. They described the presence of the issue by the following expressions: population does not participate in decision-making, it is difficult to express opinion, nobody wants to listen to our opinions, society is so used to be excluded that they do not even demand participation, no consultations with locals, only sometimes some members participate in public hearings, existing institutional challenges hinder the participation process, knowledge of the locals is valuable, bad cooperation between authorities and locals, no official goes to the region to listen to them, no villager will come to the town unless there is a special need, people need to feel themselves as owners of the situation.

The next aspect that was highlighted by almost all interviewees was the issue of 'Illegal fishing'. This is particularly very critical aspect in the region and affects also the whole country. Because of the illegal fishing activities it was estimated by the National Academy of Sciences[2] that natural fish populations of endemic trout stopped existing, some spotted individuals are sometimes emerging because of annual artificial introduction of juvenile fish into the lake. But the recovery of the population is not possible because of high level of poaching. Introduced whitefish population also repeated the same story as trout. The only remaining species are crucian fish populations that find itself in a very favourable food niche in the absence of competition.

Different aspects of 'Illegal fishing' activity were mentioned, but the one most obvious were social bad conditions and absence of workplaces. The presence of the issue was described by the following expressions: poaching is sometimes forced by the inspectors, fishing gears with small holes that catch small fish and do not allow the fish to reach its reproduction, disastrous law on licensed fishing, catch is not controlled and regulated.

The other three themes that appeared from the Rich picture were 'Law enforcement', 'Low awareness', and 'Alternative work places'. Views expressed about those issues are the followings correspondingly:

'Law enforcement' – not proper application of existing legislation, too much bureaucracy, limited capacities of managing organizations, absence of political commitment, principles of the Law on "Lake Sevan" should be implemented, everything is on paper, every citizen should promote enforcement.

'Low awareness' – need in cognition change, shift in thinking, shift in mentality, environmental education and low awareness level.

'Alternative work places' – social bad conditions because of lack of workplaces, migration of the population, municipal employment programs are needed, biogas production can be an alternative.

From those described themes further work was concentrated on the two issues of concern – participation and illegal fishing. Those issues were paid more attention during discussions and some proposals were made on some of their aspects' improvements.

The rest of this chapter is a detailed description of the analysis I conducted on each of the two selected issues. This analysis guided by the stages of SSM is presented in the same sequence namely

4.2. The issue of 'Participation'

4.2.1 Root definition of the system to tackle "to raise the quality of participation" issue

The following is the description of what the notional system "to raise the quality of participation" that will be created has to achieve and do. This is described precisely in words and is called the Root definition, where central is the transformation statement. In its final look as it appears here, it contains all elements of the CATWOE checklist:

> **"***A system to be owned by government and society and operated by the Ministry of Nature Protection, Sevan national Park, Local authorities and representative groups of the society, for the benefit of the society, every citizen, region, representative groups, recreational users, water users, landowners, fishermen and the municipality resulting in the higher quality and higher level stakeholder participation in the management of lake Sevan through searching more appropriate forms of participation that are acceptable and desired from the society under their socio-economic and cultural conditions and through motivating and enabling them to regain their natural/civil entitlements in the lake ecosystem. A system is considered desirable because people affect, affected and are responsible for the environment they live in, have right to receive information and participate in the decision making and differences in perspectives should be reconciled to achieve a balance of increased and motivated participation. The interests of those without voice will be ensured by the constitution and environmental laws. Public will and political commitment are the factors that might constrain or assist the operation of the system and are out of system's control".*

CATWOE mnemonic

C 'customers': Every resident**,** Representative groups**,** Society**,** Region, Recreational users**,** Fishermen**,** Landowners**,** Water users, Municipality

A 'actors': Ministry of Nature Protection**,** Sevan National Park**,** Local Authorities, Representative groups of the society

T 'transformation': "A system to *raise* the quality and level of stakeholder participation in the management of Lake Sevan through *searching* more appropriate forms of participation that are acceptable and desired from the society under their socio-economic and cultural conditions and through *motivating* and *enabling* them to regain their natural/civil entitlements in the lake ecosystem "

O 'owners': Government**,** Legislature**,** Society**,** Locals

E 'environmental constraints': Public will, Political commitment

W 'weltenschauungen'- World View: People affect, affected and are responsible for the environment they live in. People have right to receiving information and participating in the decision making. Differences in perspectives should be reconciled to achieve a balance of increased and motivated participation

The TWOCAGES is the improved version of CATWOE mnemonic that contains two additional aspects, namely Guardians representing those whose voices cannot be heard for one reasons or another, and System of Interest, which actually means the system that was envisioned and described, containing the different sub-systems, with the latter representing different human activities that a system must carry out in order to transform the input into the output.

Table 2. TWOCAGES

T: transformation	**Input:** Low quality and level of participation **Output:** Higher quality and motivated participation
W: world views	It is people's natural/civil right to participate in decisions regarding the environment they live in.
O: owners	Government, Legislature, Society, Locals
C: customers	Every resident**,** Representative groups, Society**,** Region Recreational users**,** Fishermen**,** Landowners**,** Water users**,** Municipality
A: actors	Ministry of Nature Protection, Sevan National Park Local Authorities, Representative groups of the society
G: guardians	Society Government
E: environmental constraints	Public will Political commitment
S: system of interest	Motivating and enabling the residents to regain their natural entitlements in order to rise the quality and level of participation

HAS model

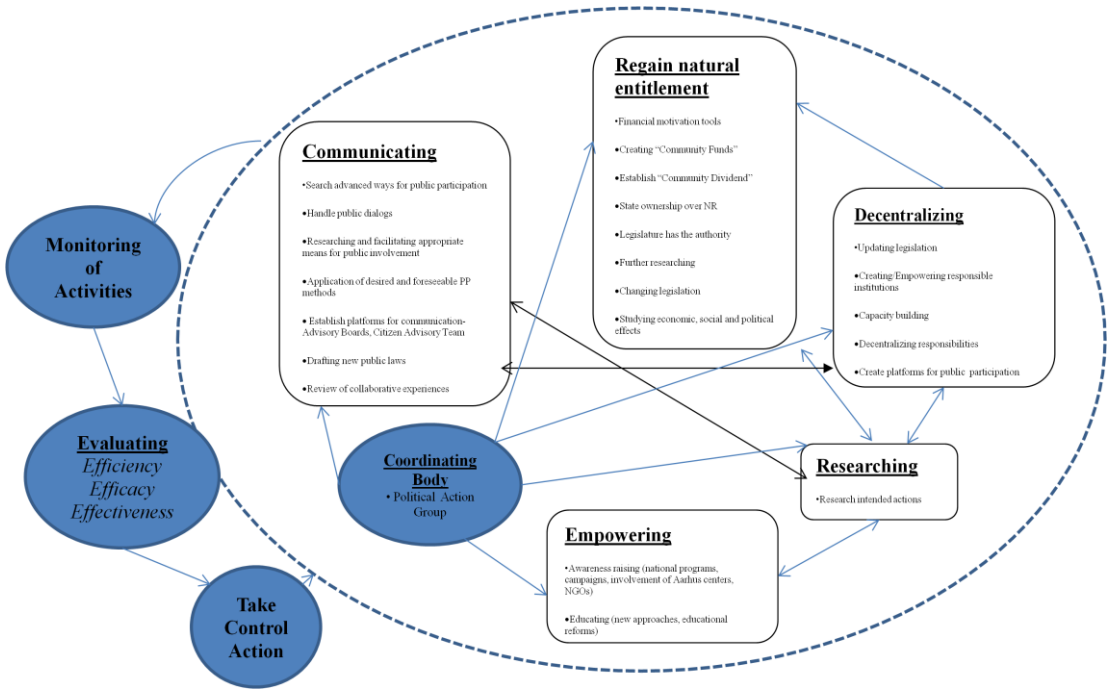


Figure 7. Conceptual model for "to raise the quality of participation" issue

4.3 Conceptual Model Building

In this chapter the detailed description of system of interest is given that might bring about the desired transformation. Main activities are listed under each subsystem that in case of application will work towards achievement of the higher quality and level of participation.

Decentralization of the management

- Updating or restructuring the existing legislation
- Creating or empowering the responsible institution(s)
- Capacity building (training staff)
- Decentralizing responsibilities
- Create platform for public participation

Regain/restore natural/civil entitlement of people

- Use of "Financial motivational" tools
- Shared ownership over natural resources is a vehicle to accomplish the goal of motivated participation and to informally engage public to think about important public policy issues.
- Payments from resource use of lake Sevan ecosystem can be collected in the savings account to form a "Community Fund"[45],
    - Fund provides a base income level to each citizen regardless of means, and contributes to equality in the distribution of income.
    - The legislature has the authority to use fund earnings for any public purpose.
    - The size of the fund is calculated as half of the earnings of the Fund averaged over preceding five years dividend by the number of eligible residents,
    - An eligible resident is a person of any age who has lived in the state for at least one year, who intends to continue to reside in the future.
- State ownership over natural resources means that people own the resource and the revenues from its sale should be distributed to the owners as dividend.

[45]Goldsmith, 2001,

- To increase the incentive for community action would be to have a "community dividend"[45] that would be distributed to each community based on the number of residents.
    - Residents would be free to spend the community dividend any way they wanted, but they would have to jointly determine how it would be used.
    - Under such circumstances it might be more likely that the money would stay in the area or region a d will enable to purchase physical facilities that would produce continuing benefits for residents-current and future.
- Further research is needed if this idea is to come true.
- Legislation changes will be needed
- The Fund will have significant macro- and microeconomic effects, which needs also to be studied.
- It will have also social impacts that again need studying.
- Fund can serve as "Population magnet" and will cut a bit the migration,
- It can have positive effects also in improving social conditions (especially in rural areas) and can reduce the pressure on the over exploitation of natural resources of the lake Sevan ecosystem.
- It can have serious political effects also
- Without a group defending the fund against attack the fund can serve to special interests leading to the spending the earnings inappropriately.

Communicating

- Search new more appropriate ways for public engagement.
- Handle public dialogs in order to listen to people's needs in terms of participation
- Researching and facilitating learning from the community about appropriate means of public involvement under given socio-economic and cultural conditions[46]
    - Public communication
    - Public consultation
    - Public participation or even Citizen engagement
- Application of desired and foreseeable public participation methods[46]:
    - Citizen juries
    - Citizens' panels

[46] HCC, 2006,

        - Citizen dialogs
        - Scenario workshops
        - Deliberative polls
- Establish platforms for communication:
    - Create "Advisory Boards" [47]to provide forum for effective two-way communication
        - AB is comprised of local community members, environmental regulators, local government representatives and other key stake holding and interested parties
        - AB members should live and/or work in the affected community or to be impacted by the proposed actions,
        - AB enables to have meaningful dialogue with, provide advice and recommendations and work towards a common goal.
        - AB members act as focal point for two-way communication with the public by relating community concerns to the government which then communicated back to the community
        - AB is chaired by two people-community representative and Government rep.
    - Creation of "Citizen Advisory Team"[47], which includes representatives from MNP, Scientific community, contractors, AB members, and all relevant community leaders.
- Review of collaborative experiences that have worked in other communities
- Drafting new public laws to create and fund paradigm shift in the process that includes citizen input in decision-making

Empowering

- Awareness raising
    - Establishing national programs to enhance awareness and inform public about environmental matters that affect themselves.
    - National campaigns to train people (Public and Private units)
    - Involving Gavar Aarhus center and environmental NGOs
- Educating

[47]Pirizzia, 2005,

- Researching and applying new approaches for environmental education
- Conducting educational reforms

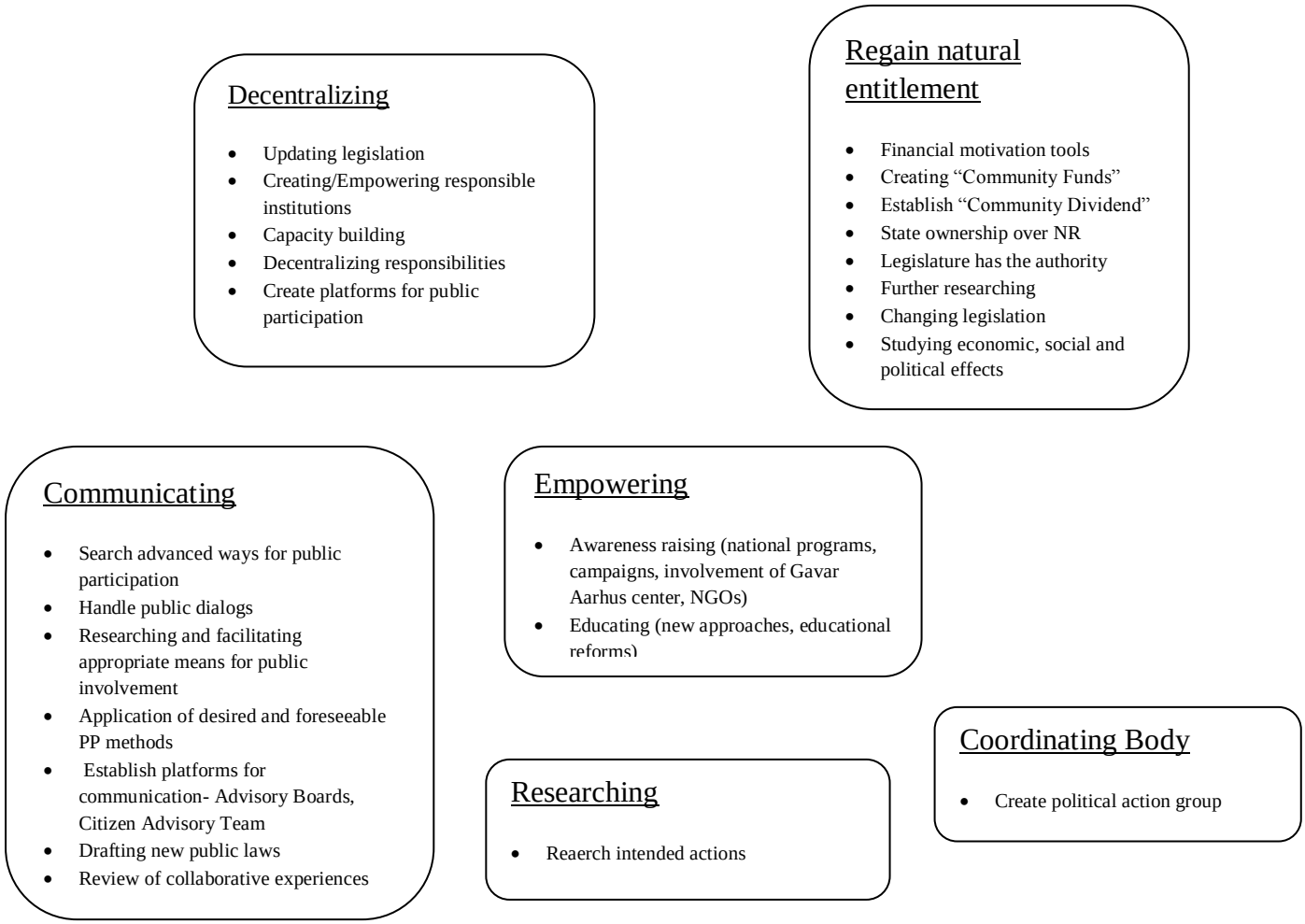
Researching

- Continuous research has to be conducted about any intended action to provide adaptive capacity of the "system"
    - This role can be handled by different research institutions and maybe also international institutions

Coordinating Body

- Creating a political action group to promote change in legislation and conduct the managing and coordination actions to enable the "system" to function and accomplish the intended transformation.

Developing main components of the model



4.4 The issue of illegal fishing

4.4.1 Root definition of the system to tackle "to reduce Illegal Fishing" issue

The following is the description of what the notional system "to reduce illegal fishing" that will be created has to achieve and do. This is described precisely in words and is called the Root definition, where central is the transformation statement. In its final look as it appears here, it contains all elements of the CATWOE checklist:

> *'A system to be owned by government and society and operated by the Ministry of Nature Protection, Ministry of Agriculture, Ministry of Trade and Economic Development, Sevan national Park, Local authorities and representative groups of the society, for the benefit of the society, every citizen, region, representative groups, future generations, recreational users, water users, landowners, fishermen and the municipality resulting in the reduced Illegal Fishing activities through identifying and developing alternative ways to create income for the society and reduce the social pressure and overexploitation of the fish resources in the lake Sevan. A system is considered desirable because fish resources are important both for the sustaining the ecosystem and to serving for public needs and therefore need to be preserved. The interests of those without voice will be ensured by the constitution and environmental laws. Social and economic constraints and political commitment are the factors that might constrain or assist the operation of the system and are out of system's control'.*

CATWOE mnemonic

C 'customers': Every resident**,** Representative groups**,** Society**,** Region**,** Recreational users**,** Fishermen**,** Landowners**,** Water users**,** Municipality**,** Future generations

A 'actors': Ministry of Nature Protection**,** Ministry of Agriculture**,** Ministry of Trade and Economic Development**,** Sevan National Park**,** Local Authorities**,** Representative groups of the society

T 'transformation': "A system to *cope* with and *reduce* illegal fishing through identifying and developing alternative ways to create income for the society and reduce

the social pressure and overexploitation of the fish resources in the lake Sevan"

O 'owners': Government, Legislature, Society, Local

E 'environmental constraints': Social constraints, Political commitment, Economic constraints

W 'weltenschauungen'- World View: Fish resources are important both for the sustaining the ecosystem and to serving for public needs and therefore need to be preserved. Illegal fishing is a crime and should inhabit in the perceptions of the society Prohibiting catch of the fish will affect especially strictly the poor in society.

Table 3. TWOCAGES

T: transformation	**Input:** High levels Illegal fishing activities **Output:** Reduced Illegal fishing activities
W: world views	Fish resources are important for ecosystem and public, Illegal fishing is a crime, Prohibiting the catch will affect the poor at most
O: owners	Government, Legislature, Society, Locals
C: customers	Every resident**,** Representative groups**,** Society Region**,** Recreational users**,** Fishermen Landowners**,** Water users**,** Municipality**,** Future generations
A: actors	Ministry of Nature Protection, Ministry of Agriculture Ministry of Trade and Economic Development, Sevan National Park Local Authorities , Representative groups of the society
G: guardians	Society, Government
E:environmental constraints	Social constraints, Political commitment, Economic constraints
S: system of interest	Illegal fishing activities can be reduced if the attention is paid to improve other sources that can generate income.

HAS model

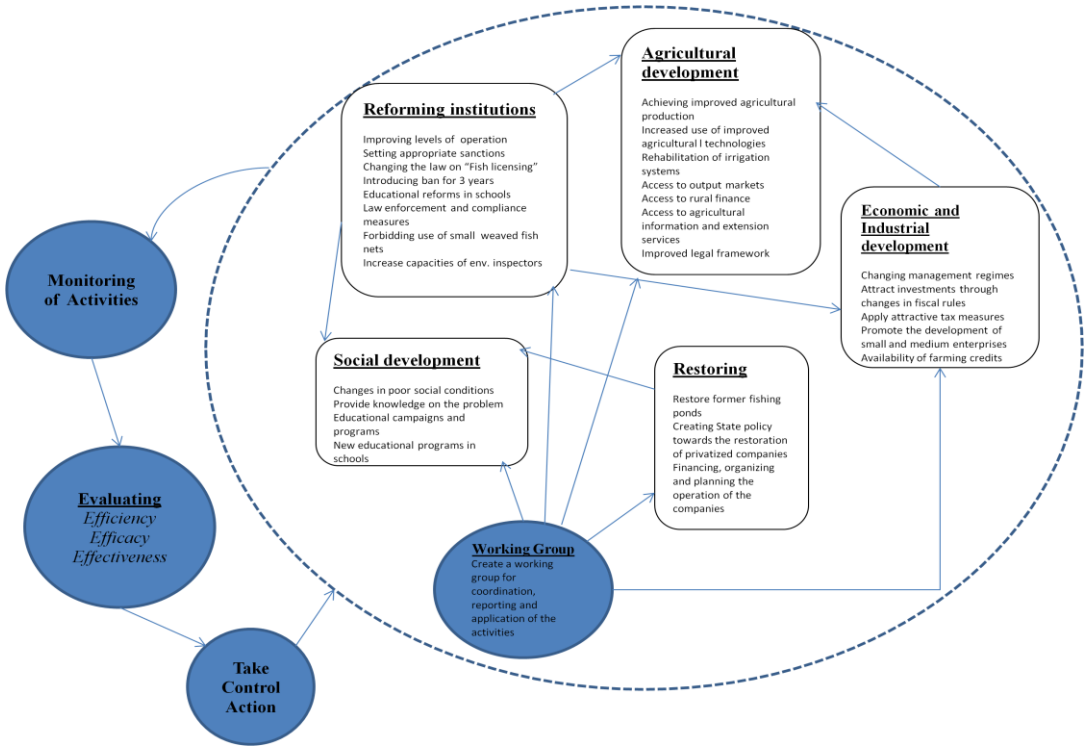


Figure 8. "To reduce Illegal Fishing" system

4.5 Conceptual Model Building

In this chapter the detailed description of system of interest is given that might bring about the desired transformation. Main activities are listed under each subsystem that in case of application will work towards achievement of reduced level of illegal fishing activities.

Reforming institutions

- Improving the levels of operation
- Setting appropriate level of sanctions
- Changing fundamentally the existing law on "Fish licensing"
    - Establish unions (people subscribe to a union)
    - Union is an entity which will have license, not the person
    - Unions are obliged to breed fish not just catching
    - Contracts will be signed with unions disseminating responsibilities to all parties involved
- Prohibiting the catch of some species

    - Introducing a ban for 3 years
- Educational reforms in schools
- Law enforcement and compliance measures
- Forbid the use of small weaved fish nets
- Increase the capacities of environmental inspectors of the region
    - Raise the salaries and thus reduce the risk of the corruption

Economic and industrial development

- Changing inappropriate management regimes
- Attract investments through changes in fiscal rules
- Apply attractive tax measures for promoting the development of industry as one of the main former sources of job creators
- Promote the development of small and medium enterprises
- Availability of farming credits

Social development

- Introduce changes in poor social conditions
- Considering the Illegal fishing activities a crime from moral point of view
    - Provide knowledge on the seriousness of the problem
    - Educational campaigns and programs
    - Create new educational programs in schools

Agricultural development

- Achieving improved agricultural productivity[48]:
    - *Increased use of improved agricultural technologies* (good quality seed and planting materials, promoting organic fertilization, mechanization through leasing schemes whereby farmers have access to appropriate mechanization at reasonable cost),
    - *Rehabilitation of irrigation systems* (undertake an inventory of existing irrigation systems and irrigation needs, investment for rehabilitating and upgrading

[48] Gegharkunik Marz, "Regional Development Plan", 2006-08,

irrigation systems as appropriate, support to establish Water Users Association, and the provision of capacity building support in irrigation systems management and maintenance, measures to reduce water delivery costs, construction of small- and medium-sized water storage facilities),

- *Increased access to output markets* (increased access to wholesale and export markets, establishing storage and refrigeration facilities, promote farmer co-operatives for collective marketing and jointly managing storage facilities),
- *Increased accessed to rural finance*
- *Increased access to agricultural information and extension services*
- *Improved legal framework*

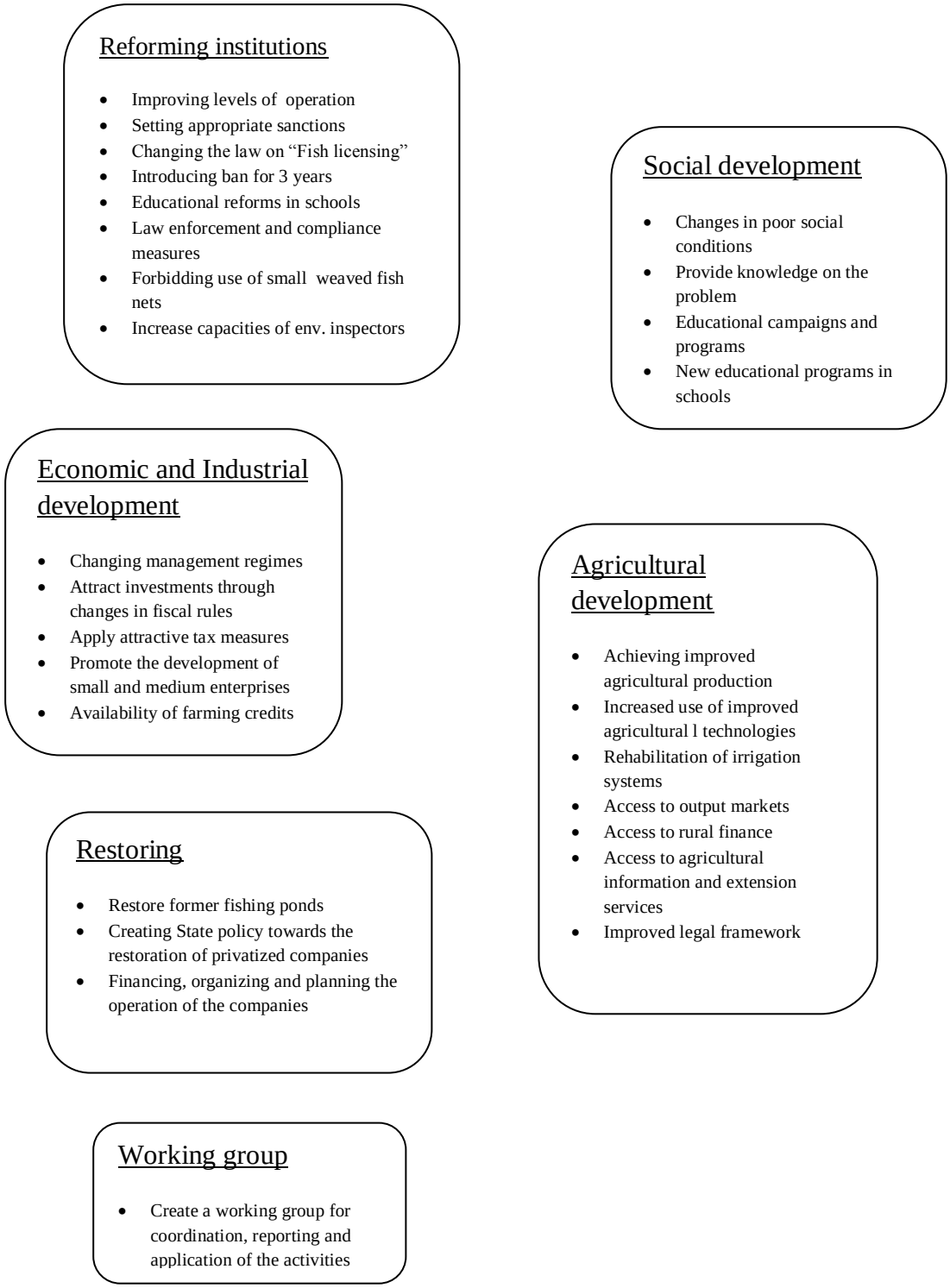
Restoring

- In order to restore the stocks of indigenous fish species fishponds in Sevan, Gavar, Lichq and Karchaghbyur should be restored to release juvenile fish to the lake.
- State commitment is needed to deal with the privatized companies restoration (they were formerly state operating companies and were privatized)
    - Formulate direct policy for the reoperation of the companies
    - Introduce sanctions for not operating these fishponds
- Direct financing, organizing and planning of the operation of these companies

Working group

- Creating a working group for coordination, reporting and application of the activities

Developing main components of the model



5. Discussion

The discussion section is presented here at two levels. The first level describes the outcomes from the systemic analysis between present reality of proposed activities and the recommended actions and action plans of two chosen issues. The second level discusses the new awareness and understandings that was gained from the theoretical framework, methodology and the change that the intervention created in the situation.

5.1 Systemic analysis of reality and recommended actions

Here follows detailed explanations of the outcomes of the comparison in "Participation" and "Illegal Fishing" systems.

5.1.1 Outcomes of the comparison in 'participation' system

As it was mentioned in Chapter 3, the comparison tables were developed by using literature on them to the extent it was possible and also incorporating views of stakeholders previously expressed.

The system of interest that was designed to bring about desired change had six components that are the subsystems. Each subsystem that is represented in the form of human activities tackles specific aspect towards achieving the transformation that is to transform the low quality and level participation into higher levels and quality.

The comparison of the system of interest with the real world revealed that most of the human activities intended to achieve transformation are not present in today's reality. Only some of them were present.

The outcomes presented here are chosen after comparing with the reality and debating about the desirability and feasibility of these actions among key stakeholders.

One of the main outcomes from this comparison and debate is the fact that the goal of this system should be achieved in terms of incorporating some financial motivational tools. The justification was that financial motivations work in every society, but in the given poor social and economic conditions these tools might be among the things that will work.

These insights are embedded in the creation of one organization independent from the state which will be called 'Civil fund'[45] and had to be formed through changes in the constitution. The Civil fund will be formed from the resource use payments in the region and each year the earning of this fund will be distributed to the local residents as dividends. The Team of professionals will be conducting the explanatory and coordinating work, but the decision making authority will belong to the fund itself.

Therefore this mechanism will allow residents feel themselves as owners of the resources being exploited and will give tools to influence the exploitation, they will be more motivated to participate and the participation will definitely have another format and quality.

The new aspects of these actions are that they will be totally independent form the state. These actions cannot be called 'decentralization' because they are independent form the state authority and budget, which rather again 'centralization', but in the form of the 'shift of the authority'.

Anyway these aspects were the initial thoughts and were taken from the 'Alaska Permanent Fund' idea, but in significantly changed way. This idea was proposed from one of the stakeholders involved in the situation and had wide debate during the second workshop with the stakeholders. The initial observation was that this idea interested almost everyone present in the discussion. That talk about its huge potential, but the constraints that are obvious has also to be taken into account, because it requires the strong commitment and the will of the state to shift its authority. These are the undiscussable aspects of this system of interest.

Another important outcome is the necessity to investigate better grounds for stakeholder involvement. The grounds of stakeholder involvements are very weak and do not correspond with the desires of stakeholders and possibilities for participation. There is a necessity to know what kind of methods should be applied to have better quality and level of participation. Armenia has signed and later ratified the Convention on Access to Information, Public Participation in Decision-making, and Access to Justice in Environmental Matters, also called Aarhus Convention in 2001[1] (see Appendix 7). To promote the Convention and its goals Aarhus centers are established that serve as platforms for having discussions and promoting activities on environmental protection and sustainability. They also provide easy access to the information, raise public awareness and provide legal advice[49]. These centers mostly serve the objectives within the context of the 'information pillar' of the Aarhus Convention, although in some countries activities performed by the Centers have also included assistance to the citizens to participate in environmental decision making and, to a lesser extent, access to justice[50]

So the question arises, what is the point of creating so many institutions, and not using and empowering them? It is clear that those centers are able to handle any of the pillars of the Aarhus Convention including public participation issue, if there is a will to promote it, if there is an enabling environment for that.

Robert Chambers (1997) stresses the importance of empowerment that entails enhanced capabilities and wider scope for choice and action. It requires and implies changes in power

[49] www.osce.org,
[50] www.unecce.org,

relations and behaviour, which can be analysed under three headings: institutional, professional and personal. They are linked with each other and are able both to enforce and provoke changes in the others. Institutions should become sort of learning organizations, to flatten and soften the hierarchy, to develop a culture of participatory management. The shift of normal professionalism into new ones has to happen that establish participatory approaches, bottom up, privileging local, complex, diverse, dominant and unpredictable realities. Changes in personal strategies and tactics are necessary to challenge the excesses of centralized power, convention and uniformity, to empower others to express their realities[51].

Radical changes have to happen in institutional, professional and individual spheres. Institutions should build trust in individuals and through the new professional and management approaches go towards empowerment.

5.1.2 Outcomes of the comparison in 'Illegal fishing' system

The system of interest that was designed to bring about desired change has six components that are the subsystems. Each subsystem that is represented in the form of human activities that tackle specific aspects towards achieving the transformation that is to cope with and to reduce the high level of illegal fishing activities.

The comparison of the system of interest with the real world revealed that a bit more than half of the human activities intended to achieve transformation were present in the reality. Only less than half were not present.

The outcomes presented here are formed after comparing with the reality and debating about the desirability and feasibility of these actions.

It was revealed that further enforcement measures and imposing higher sanctions will not yield results and will be feasible in social better conditions. Claimed ban for 3 year has to be put for a longer period, because there is no fish in the lake now.

One of the main outcomes was the creation of other conditions for fishing. Existing law on 'Fish licensing' was seen as the totally wrong approach towards the management, because there are about 1766 people are engaged with fishing, fish developing, fish moving and selling. Because so many people have licenses to fish, the management has become too complicated and uncontrollable. Debate revealed that license should be given only to one organization which is the Sevan National Park, then the park will hire or sign contracts with fishermen and only those people will be allowed to fish by the boats and gears provided by Park. In this way the size of the fish caught and the quantity better regulated.

[51]Chambers, 1997,

The other possibility was to create fishermen unions and give a license to those unions not individuals. Unions would be responsible not only for catching but also for breeding the fish. Contracts will be signed with unions disseminating responsibilities to all parties involved.

Those ideas were among the new contributions in the lake situation, and have a great potential.

If we assume that those who are engaged in poaching are homogenous, then the conventional common-pool resources theory[38] would be validated here. In this case giving the right to fish to the Sevan national Park, which is operating under the control of the Ministry of Nature Protection, will mean to give the property rights to that organization and would be the change of the formal management mechanism.

Establishing fishing unions would emphasize the importance of informal institutions to influence human behaviour, and cooperation among them may be essential to limit the rate of extraction and to sustain the regenerative power.

Social, economical and agricultural development measures that were included in the model were to some extent present in the reality and their realization depends on strong political commitment and funds. The Agency of Biodiversity was seen as the initiating, coordinating, reporting organization.

5.1.3 Discussion of Action Plans

In the implementation phase of soft systems approach, there are three possibilities for the facilitator: to withdraw after the conclusion of debate phase, full involvement in and beyond implementation, monitoring and indirect assistance[24].

For the purposes of my research I decided to withdraw at the end of debate stage, for two basic reasons. The first one which is the most important, was that the application of soft systems approach was initiated by me, not by the customers in the situation, and second, the three months period was not enough to go also through the implementation of the activities, because from the change point of view it is most crucial stage to my view and can even be gone through another cycle of SSM, or another cycle of thorough discussions and debates.

But to leave stakeholders with something at hand that may be useful if they consider it for implementation was my ethical obligation, especially taking into account the fact that I was asked to send the Action Plan ‘to raise the quality of participation’ to one of the stakeholders. I have received back comments on it saying that the overall idea is captured, but there are roles that need to be discussed.

After the debate of desirable and feasible changes Action Plans were developed for both of the selected issues. The purpose to develop the Action Plan is to try to see that those actions

that survived the stage six and were considered both desirable and feasible, how they will be implemented. Here the attempt was made to think of who will be carrying out those actions with whose collaboration, how those actions will be carried out, what time span, and what is also essential what kind of resources would be needed for those actions to be implemented.

If we look through the both Action Plan we would see that most of the actions need both human and financial resources, but there are some in the Action Plan 'to reduce Illegal fishing' that require only human resources, which indicates that the likelihood for these actions to be implemented is higher.

Further those changes which does ensue will be the by- product of the whole process rather than the outcome of stage seven[28].

Anyway, the developed Action Plans were attempts to sketch the 'hows', but this does not mean that they are complete and include all information they should have. For example, they do not include the exact budgets of each activity that will make a great sense when it comes to their implementation.

If they are to be implemented they have to go through the exhaustive stage of discussions and changes, with appropriate facilitative support.

The comparison of the present reality with the recommended actions revealed several essential insights in understanding the complexity of the situation and proposed several actions that were agreed by the stakeholders involved in the situation and shed some light at the level of application of Integrated Water Resource Management as a management concept.

5.2 Theoretical understandings

Although The Republic of Armenia has established legal and regulatory promising framework for Integrated Management of Water Resources as Table 8 indicates, there are shortcomings that the country will be addressing in the future. However these are certainly achievements on which the country will build its future towards sustainable utilization of its natural resources.

Table 4. Main achievements of Armenia towards Integrated Water Resource Management: Legal and Institutional reforms.

N	What?	Year	Purpose
1.	Concept Paper for Reforming Water Resources and Water Systems Management in Armenia	2001	Presented the strategy of institutional reforms of the Armenian Government in the field of water resources. Institutional framework envisaged by the Water Code of Armenia almost entirely implies from the above-mentioned Concept (NPD, 2008).
2.	State Committee on Water Systems	2001	Was established in charge of coordinating and managing

			activities of organizations in charge of the operation of water systems
3.	Water Resources Management Agency	2001	Has been established in charge of regulating water resources management issues
4.	Water Code	2002	It serves a basis for the water sector's legislative framework
5.	National Water Council.	2002	The Council should provide a forum to hold dialogues, and discuss a number of important inter-agency water related issues that will unavoidably arise while managing water resources in the country.
6.	Commission for Transboundary Water Resources	2002	The RoA Commission for Transboundary Water Resources jointly with respective commissions from neighbouring countries is in charge of resolving water resources protection and management related issues.
7.	Law on 'Fundamental Provisions of the National Water Policy'	2005	Presents a long-term development concept for strategic use and protection of water systems
8.	Law on the 'National Water Program of the Republic of Armenia'	2006	The overall goal of the law is development of measures aimed at satisfying the needs of the population and economy, ensuring of ecological sustainability, formation and use of the strategic water reserve, and protection the national water reserve.
9.	6 Territorial Divisions established		To promote more efficient, targeted and decentralized management of water resources
10.	80 regulations and by-laws	Since 2002	They relate to the procedures of issuing water use permits, river basin management, transparency and public participation in decision-making process, information accessibility, establishment of the State Water Cadastre (SWC) and others (NPD, 2008).

Those countries with mature or long-lasting democracies tend to be more conductive to IWRM as they tend to have a strong and well-established base of multidisciplinary specialists who engage in management and other actions. In contrast, the same high levels of capacity and development are seldom found in developing countries that have had independent democratic systems of government for less than 25 years[52].

If we look at the origins of IWRM, to those who promote this concept, for instance Global Water Partnership, will see that successful application practices is highly dependent from the certain political and economic system. Those liberal democratic countries that are developed and promote this concept can actually generate good practices of its application. For the developing countries where political and even the most crucial aspect - the economical systems are also developing, IWRM is a real challenge.

In addition, it is not even surprising that there is actually a tendency in developing countries as discussed IWMI report[17] in to view IWRM as a blue print package which means that they tend to incorporate the underlying principles of IWRM by establishing for instance water

[52] Turton et al, 2007 in N. Funke et al., 2007,

legislation and policy, recognizing river basin as the appropriate unit for planning and management, treating water as an economic good, participatory water resource management etc.

But will this mean as doing IWRM? I would argue that it will not make sense unless IWRM is not viewed as a continuous process of learning and adjusting.

Integrated Water Resource Management is an approach, a perspective, and a way of looking at problems and how to solve them. It is not a dogmatic concept, it is elusive and fuzzy and we are still learning, striving for clarity[53].

Integrated management is a process and a long lasting one. Having created all necessary legal and institutional grounds will not guarantee that the positive outcomes will be achieved. Many efforts may be spent on creating those grounds, but the most challenging is to follow the process.

Whilst an appropriate legal framework must be in place to achieve IWRM, the real challenges lie in the successful implementation of IWRM. Are governments in developing countries capable of performing all the crucial functions that the IWRM framework requires of them? Unfortunately, this is often not the case due to shortages of economic, technical and human resources[54].

This investigation results have demonstrated that application of soft systems approach revealed considerable inefficiency in water as well as related resources management that were under stakeholders' high concern. Some of them are site specific, but others can be generalized for the whole country's situation. For instance, the issue of 'stakeholder participation in decision-making', which is also the underlying principle of integrated approach, is a problematic issue for the whole country's water management mechanism.

Although Armenia has ratified the Aarhus Convention at 2001 and the Water Code call for public notice and comment procedure on it major provisions by ensuring access to information[1], the mechanisms through which that information is conveyed to the public are not sufficiently efficient[55]. In addition Water Basin Management authorities were created that among other responsibilities, should have served as liaison between the Water Resource management and Protection Authority and the community served by the water basin[1]. Here again worth mentioning the point of empowerment highlighted by R. Chambers earlier in this chapter.

A number of Institutional and legal developments were underway to deal with participation issue (see Appendix 12), but it hasn't gone far from implementing access to

[53]van der Zaag, 2005,

[54]Funke et al., 2007,

[55] NEAP, UNDP, 2008,

information pillar of the Convention. Implementation of public participation pillar is still in a preliminary stage[56].

The main problem often mentioned by the stakeholders during the interviews was the absence of the opportunity to voice their concerns, not talking even taking part in the decisions that affect them first of all.

Currently, there are certain positive changes in some countries like Armenia, Kazakhstan and Kyrgyzstan, but as a whole the role of socially active members in water management is obviously insufficient. The state has to watch over the public interests, but often in pursuing of political and economic goals, it ignores social aspects[57].

It is important to consider the role of politics as forming a part of the problem as well as the solution and adoption of more socially oriented approaches, with particular emphasis on the need to develop mediation skills[52].

All the aspects mentioned above give impression that IWRM in Armenia also was seen as a blueprint, which entailed establishing legal and regulatory framework and not enforcing and empowering it.

While all the challenges that exist in the way of implementing IWRM in developing countries, there are certainly opportunities for improvement and on the way of identifying those possibilities all means will be perfect. The important aspect is to have that will and commitment to do so.

Given the time constraint the study revealed not so many but very crucial aspects of IWRM implementation. Public participation has vague grounds and it is essential to provide appropriate mechanisms for public involvement. This currently is and will become an increasingly outstanding issue in Armenia.

5.3 Methodological insights

In this work I tried to apply Soft Systems Methodology in the pilot area called Lake Sevan. My choice of this area had its reasons. First because there is an evident water management failure to address the problems, though considerable efforts have been made to deal with those problems. And second, it is a good model for the assessment, because the hydrological and administrative boundaries coincide with each other, thus enabling to have as comprehensive view as possible.

[56] OECD, 2007,

[57] Sokolov, 2006,

As it was mentioned earlier properly considered methodology is 'the logos of method', the principles of method'[22].

As it is described in the LUMAS model (Fig. 4) the user appreciates the methodology, then tailors from that methodology a specific approach which is actually the 'method', that he or she considers appropriate for that particular situation. Application of this method generates new insights about the methodology that might be even different from the initial appreciation of the methodology by the user.

Application of the method that was tailored from the principles underlying SSM yielded at least one maybe the most important new understanding. Among other important and insightful underlying principles of soft systems approach, there is the one which at the end to me gained different appreciation as before. It is the notion of the 'boundary'.

Then the question arises, who is responsible for establishing the boundaries? There were debates some emphasizing the role of individual as an autonomous decision maker, meaning the analyst, the other stressing that the this burden should be seen as resting with stakeholders in the situation. Midgley (2000) takes both sides and argues that any agent (whether an individual, dialogue community, organization etc), in interaction with the knowledge generation systems of which it is a part, can be seen as morally responsible for decision-making about the establishment of boundary[25].

The 'learning aspect' is an advantage of this methodology, because as you experience any specific situation you enter in a continuous process of learning and changing through reflecting about yourself as facilitator and about the situation.

Real world experience is valuable for learning. Facilitating and leading a large groups of people with limited experience and especially having similar experience in developed country, is a very difficult task. But every situation is a learning process and sometimes it is immature to think that what is applicable and implementable in developed country may work in developing country.

SSM is a participatory approach towards problem improvement and even though the participatory grounds in Armenia are weak and not common, it would be very easy to apply those kinds of approaches if you pay attention the 'motivation' factor to bring stakeholders together. In this research, their participation was on the voluntary basis, but even then it did not hinder their participation both consciously and unconsciously.

While recognizing that no view on the world can be comprehensive[25] the systems idea highlights the bounded nature of understandings. The boundary defines the extent of knowledge to be considered in the particular situation and the people who generate that knowledge meaning those who will have roles. That is to say that the idea of boundary also decided who is in and

who is out, what is included in the 'whole' understanding, and what is excluded considering that there will always be another boundary which will include that 'whole' and will form another bigger 'whole'.

That is the great difference between the two concepts of IWRM and soft systems approach. While IWRM emphasises 'integration' without setting clear boundaries, Soft systems approach contains the understanding of 'wholeness' bounded from the environment. Though there are also similar underlying understandings, namely the 'stakeholder involvement' principle in IWRM and the recognition of different 'worldviews' in systems approach.

Because of the absence of unambiguous definition of IWRM, the concept has substantial difficulties when it comes to the implementation of the ideas of that framework. But it does not forbid the use of other methods that can act in a supportive manner. Soft systems approach was used to examine the level of IWRM applicability and to come up if possible with the improvements.

5.4 Change in the situation

Intervention by itself intends change. It is not possible to step in and out and leave situation untouched. You are changing it both in positive and negative ways.

The work of SLIM found that stakeholders operating within a conductive situation change their understanding and their social and technical practices. They collectively construct the issue and its solutions through this process of building concerted action. This contrasts with a process where problems and solutions are defined through fixed forms of knowledge[58].

This is illustrated in the Figure 9:

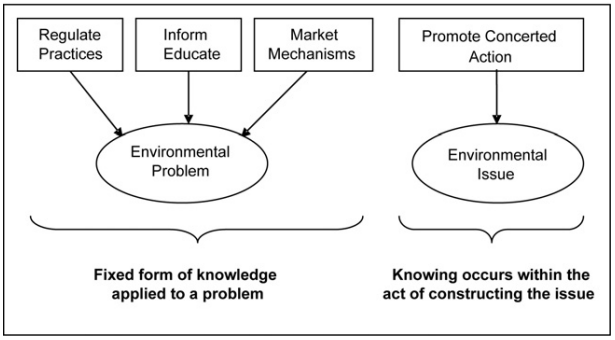


Figure 9. Promotion of concerted action based on 'knowing in action' rather than on the transfer of knowledge (Ison et al., 2007).[59]

[58] SLIM Framework, 2004,

[59] Ison et al., 2007,

While conventional policy responses towards the solution of environmental problems mainly associated with regulations, market forces and raising awareness through dissemination of information, resolving environmental issues involves social change. When stakeholders are engaged in the concerted action, they build they issue and think of possible improvements to the situation. This process itself creates changes in practices, behaviours, perceptions and understandings. This change is called 'transformation' by the SLIM researchers[58].

The biggest change in the situation of Lake Sevan was the second workshop of key stakeholders and as was noted by one of the participants 'though they are used to be talked by the language of documents, during the discussion everybody become a simple citizen standing on equal grounds'. This indicates that people were engaged in concerted action of developing the improvements together, and at the same time being changed themselves.

The change that the intervention created was very valuable and crucial. For the sake of the research it was not so important how the improvements, agreed by all stakeholders, will be actually implemented, but it was of high importance the process of reaching those improvements. This process where stakeholders debate, discuss, express and claim their stakes is called stakeholding.

There are no sources in the current document.

6. Conclusions

This study conducted in the Lake Sevan area examined the level to which of Integrated Water Resource Management as a concept has been applied, to understand complexity as a step to propose improvements to the situation.

For this purposes Soft Systems Methodology was applied under the broad 'systems' understanding, which was seen as relevant in that particular situation, given the long lasting conflict regarding use of common pool resources in the area.

The technical solutions applied so far have not provided positive results because of they have been unable to deal with complex environmental situations where humans play a central role.

On the other hand, IWRM approach towards the management of water and related resources seems to be in a very initial stage and has not improved the situation. In fact, it is getting worse because of the fragmented view on the problem. In addition IWRM in the whole country seems to be viewed as a blueprint package, rather than a process.

It is evident that the problem has to be approached from a different angle. It has to be viewed as a whole, as an ecosystem that includes humans. This is the most challenging and important factor.

This is why a 'systems' approach toward problem improvement is relevant and even more, the study allows us to conclude that a 'systems' approach can support and ease the implementation of the principles of IWRM. It can fill the major gap left by IWRM, which is its inability to represent the full dimension of variables, interactions and complexity that come into play. Where IWRM calls for integration, a 'systems' approach provides clear understanding of the importance of 'boundaries' taking into account that no view on the world can be fully comprehensive, but it can be as comprehensive as possible.

The study conducted revealed several issues that are among many others that were not mentioned or revealed. These issues shed considerable light on why IWRM implementation is ineffective in Lake Sevan and perhaps in Armenia.

Based on the relevance and urgency described by the stakeholders two of those issues were considered for further work and recommendations for situation for improvements were proposed through the application of a systems approach. The issues revealed by the systems approach were substantially different from those that were previously considered and tackled. This talks about important values and knowledge that all stakeholders beginning from the lowest appropriate level bring into the situation they are part of.

Application of Soft Systems Methodology enabled the researcher and all participating stakeholders to learn experientially about its application and to reflect on their learning, which is the great advantage of this methodology.

The intervention has changed the situation and the people in it. It has opened a social space for stakeholders to be involved and to be able to influence their situation.

Whether the proposed improvements will be implemented or not was not the primary concern of this study. Prior to any implementation, the improvements would have to go through further discussions and revision stages and, even another SSM process.

The purpose of this study was to initiate and facilitate change, enable people to try to see the problem from the different perspective, and create space for concerted action.

7. Reflections

The start of my research was promising in terms of knowing personally some of the stakeholders. This eases your entry into the situation.

7.1 Interviews and interviewees

I have noticed that not every stakeholder in terms of information provision is valuable. Sometimes I meet people whom I can call key stakeholders who cannot provide you any information that can make sense in that problem. Though I recorded almost all what was said, I can say that there is a strong lack of proficiency and there is a great need to enhance professional capacities. It's funny but I have spent one whole interview but could not extract even one idea from the interviewee.

Some of identified stakeholders due to institutional changes were considered formal, but I found valuable to interview them because they express information that the one who is in position would never say.

I do not call them interviews as such, because they are more like dialogue with people. I try to extract any information I can from them by talking about Lake Sevan and about water management in general. I have noticed also, especially talking with government officials, that they say their view according to the position they have at that time. Even if they knew me, they exhibited that information that they want to hear from somewhere from somebody. In other words, I noticed some degree of self-interest in any job they are motivated to do.

During the process of interviews I had a sense that there was a wall and it was very hard to jump it. I can even give a name to this 'wall'; it is called 'indifference'. I felt a strong sense of indifference when handling interviews with some stakeholders from the central authorities. But there were of course many who were really contributing. Why was that? It seemed alright I did not experience hard times in getting people to interview, maybe because of my personal contacts. But sometimes I did not see openness, commitment of stakeholders in what they were doing. Some people simply feared to say something because they did not know you and your expectations from them. I remember being asked about what I will be doing if people just don't say what is there in reality. I made clear that I did not pursue any other party's interests; even then, they saw me as one of the 'international agents' who had some benefits and expectations from their situation. If you were an outsider and was not familiar with the culture and the understandings of people, it would be very hard to get any valuable information, because people who really contribute and are committed were not always the obvious stakeholders that you might have identified first.

7.2 Stakeholder's commitment

There was a very necessary factor called 'motivation' and tells a lot about the outcome and the effectiveness of the work done. People involved in the situation have to be motivated somehow to participate and to contribute. In my view when applying this kind of approaches where stakeholders are in the central roles, you have to be able to bring those people together, and this is a real challenge. It is very important to have real 'customers' as in the jargon of the 'those who ask you to do your research' are named. This is very important for the applicability of the methodology. Especially when you are a student, and culturally those who are students does not possess that much authority in their eyes, unless you are not a person who actually has the authority in the community, or they know you etc. So to gain credibility becomes a bit complicated.

For example in the second workshop there was an incident that shook the credibility that I was trying to gain from the beginning of the workshop. One woman was very angry, because she realized that this workshop will not give immediate solutions and was not intended to provide immediate benefits. Though I explained the positive outcomes that this work would provide, I had a sense that this was not enough for them. There are bad social conditions and nobody wants to contribute into the future, they want contribution into the present, and mostly if they will change that socially bad conditions. I tried to overcome this problem, by turning to discussions and trying to involve them into it, so that I would not lose the attention and interest. So as a facilitator you have to have a variety of skills, and most of them you cannot learn from the books, you have to gain them through experience. Therefore it would be immature to expect that what is applicable and implementable in the developed country will work in Armenia. There are specifics and one has to be aware of them.

Also it was very difficult to facilitate and lead a meeting with a large group of people with limited experience and especially having similar experience in developed country. But every situation is a learning process and it is good to have such kind of pitfalls, they promote learning in action.

7.3 Observations in the society

The overall problem in the society was that nobody feels himself or herself as the owner of the problem. Society did not feel that it can have a say. They wanted the political system to be so accountable and frank to do everything for them. The political will and commitment were absolutely absent. This perception in the society is the rudiment from the Soviet planning system, where everything was decided priori for everybody. But times have changed, in democracies people are supposed to participate and do claim their stakes. So there was a great

work to do in terms of raising awareness and educating etc. Governors were interested only when they have their own benefits from the situation, but who has to force them, that role belongs to the community. Laws were written in papers and nobody wanted to enforce them. Management processes were mechanistic-top down and not participatory. Various citizen groups and environmental NGO's that would like to input into environmental planning and management of the lake found themselves in an adversarial role. Many even children found useless to express opinion, because they were sure that nobody would hear them. Besides I noticed that society wanted to have their say but could not find ways to do it. This was especially evident from the questionnaire that I had distributed to people. The aim of the questionnaire was to gain more out of the situation, and knowing also the culture, I was sure that people may think a lot of things but due to some reasons they did not express it among the audience, though I tried to create relaxed environment. And I found signs of this in the questionnaires. The questions asked were open-ended to leave space for expressions, to enable to share view rather answer yes or no.

As an observer I noticed that there were two kinds of people in the society. Those who knew what should be, but did not have authority and means to reach that desired future, and those who complained that nothing was right, but did not have a vision what would be the future they desire.

Intervention by itself intends change. It is not possible to step in and out without changing the situation and the people involved. And at the same time the situation changes you and your appreciations.

"You can never step into the same river twice"

Bibliography

1. Abelson et al. “Deliberation about deliberative methods: issues in the design and evaluation of public participation processess”, Social Scienceand Medicine 57 (2003) 239-251.
2. Arun Agrawal, “Sustainable Governance of Common-Pool Resources: Context, Methods, and Politics”, Annual Review of Anthropology, Vol. 32 (2003), pp. 243-262.
3. A. G. Nalbandyan et al., “On Radioactivity of Lake Sevan Bottom Sedimenst (Armenia)”, was accessed on-line: http://www.ecocentre.am/labs/Nalbandyan-Monaco-2004.pdf, 26.05.2011.
4. Asit K. Biswas, “Integrated Water Resource Management: Is it working?”, Water Resources Development, Vol.24, No. 1, 5-22, 2008.
5. Bruce Mitchell, “IWRM in Practice: Lessons from Canadian Experience”, Journal of Contemporary Water Research and Education, Issue 135, pp. 51-55, Universities Council on Water Resources, 2006.
6. Cap-Net, Global Water Partnership, UNDP, “Integrated Water Resource Management Plans”, Training Manual and Operational Guide, 2005.
7. Caron Chess and Kristen Purcell, “Public Participation and the Environment: Do We Know What Works?”, Environmental Science and Technology, Vol. 33, No16, 1999.
8. Christina Pita et al., “Stakeholders’ participation in the fisheries management decision-making process: Fishers’ perception of participation”, Marine Policy 34 (2010) 1093–1102.
9. Cowx, I. G. , van der Knaap, M. , Muhoozi, L. I. and Othina, A.(2003) 'Improving Fishery Catch Statistics for Lake Victoria', Aquatic Ecosystem Health & Management, 6: 3, 299 — 310.
10. Dewulf et al, “Integrated management of natural resources: dealing with ambiguous issues, multiple actors and diverging frames”, Water Science and Technology, Vol. 52, No 6 pp 115-124, IWA, 2005.
11. Elinor Ostrom, 2000, “Reformulating the Commons”, Swiss Political Science Review 6 (1): 29-52.
12. Gadamer, 1975, p. 356, with reference to Collingwood, 1946 in Werner Ulrich: “The quest for competence in systemic research and practice”, *Systems Research and Behavioral Science*, Vol. 18, No. 1, 2001, pp. 3-28.

13. Gagik Torosyan, “Water Supply Emergency for Lake Sevan”, in R. N. Hull et al. (eds.), Strategies to Enhance Environmental Security in Transition Countries, 239-247, 2007, Springer,
14. Gerald Midgley, 2000, Systemic Intervention, Philosophy, Methodology, and Practice, Kluwer Academic/Plenum Publishers, New York.
15. Gegharkunik Marz, “Regional Development Plan”, 2006-08, A Sythesis. Was accessed on-line: http://www.renewableenergyarmenia.am/download/Regional_Development_Plan_2006_08_Gegharkunik_marz.pdf, 27.05.2011.
16. Global Water Partnership, Policy Brief 9, “Lessons from Integrated Water Resource Management in Practice”, Technical Advisory Committee (TAC), Svensk Information, Elanders 2009.
17. Global Water Partnership, “Integrated Water Resource Management”, Technical Advisory Committee (TAC), Background Papers N4, Stockholm, 2000.
18. Global Water Partnership, “Catalyzing Change: A handbook for developing integrated water resources management (IWRM) and water efficiency strategies”, Technical Advisory Committee with support from Norway’s Ministry of Foreign Affairs, Elanders 2004, Stockholm, Svensk Information.
19. Graham Smith, 2003, Deliberative Democracy and the Environment, Routledge, New York.
20. Gigliotti, Larry M. and Taylor, William W.(1990) 'The Effect of Illegal Harvest on Recreational Fisheries', North American Journal of Fisheries Management, 10: 1, 106 — 110, First published on: 09 January 2011 (iFirst).
21. Health Council of Canade, “Primer on Public Involvement”, 2006, Toronto.
22. Jønch-Clausen, Torkil and Fugl, Jens (2001) 'Firming up the Conceptual Basis of Integrated Water Resources Management', International Journal of Water Resources Development, 17: 4, 501 — 510.
23. Krystina A. Stave, “Using system dynamics to improve public participation in environmental decisions”, System Dynamics Review, Vol. 18, No 2, 2002, 139-167.
24. Kathlen Wilson and George E. B. Morren, 1990, Systems Approaches for Improvement in Agriculture and Resource Management, Macmillan Publishing Company, New York.
25. Law of the Republic of Armenia “On Lake Sevan”, was accessed on-line: http://www.cawater-info.net/library/eng/am_lak_sev.pdf, 26.05.2011.

26. Lisa Blomgren Bingham, “Emerging Practices and the Incomplete legal Framework for Citizen and Stakeholder Voice”, forthcoming in Hastings Annual Law Review, Vol. 1, Issue 1, 2008.
27. Ministry of Nature Protection of Republic of Armenia, “Armenia’s Water Resources in the Third Millenium”, UNDP, Yerevan, 2005. p 12-27,
28. Ministry of Nature Protection of Republic of Armenia, “Lake Sevan Action Program”, Main Report, the International Bank for Reconstruction and Development/The World Bank, Washington, 1999.
29. Miguel Solanes and Fernando Gonzalez-Villarreal, “The Dublin Principles for Water as Reflected in a Comparative Assessment of Institutional and Legal Arrangements for Integrated Water Resource Management”, Global Water Partnership, Technical Advisory Committee (TAC), Background Papers N3, Stockholm, 1999.
30. McDonnell, Rachael A. (2008) 'Challenges for Integrated Water Resources Management: How Do We Provide the Knowledge to Support Truly Integrated Thinking?', International Journal of Water Resources Development, 24:1, 131 – 143.
31. Mei Xie, “Integrated Water Resources Management (IWRM) – Introduction to Principles and Practices”, World Bank Institute (WBI), 2006.
32. M. Njiru et al., “An Overview of the Current Status of Lake Victoria Fishery: Opportunities, challenges and management strategies”, Lakes and Reservoirs: Research and Management, 2008, 13, pp. 1-12.
33. Naughton, John, Soft Systems Analyses: An Introductory Guide. Milton Keynes, England: Open University Press, 1984.
34. N. Funke et al., “IWRM in developing countries: Lessons from the Mhlatuze Catchment in South Africa”, Physics and Chemistry of the Earth 32 (2007) 1237-1245, Elsevier.
35. OECD, “Policies for a Better Environment. Progress in Eastern Europe, Caucasus and Central Asia”, 2007, IBRD/The World Bank: Objcetive 4.4 Agriculture, Forestry and Environment.
36. Peter Checkland and Jim Scholes, Soft Systems Methodology in Action: a 30-year retrospective, John Wiley and Sons, 2005.
37. Peter Checkland, *Systems Thinking, Systems Practice*, Chichester: Wiley, cop. 1986.
38. Peter Checkland and Scholes John, (1999). *Soft Systems Methodology in Action*. John Wiley & Sons.
39. Pieter van der Zaag, “Integrated Water Resources Management: Relevant concept or irrelevant buzzword? A capacity building and research agenda for Southern Africa”, Physics and Chemistry of the Earth 30 (2005) 867-871, Elsevier.

40. Russian Academy of Sciences, National Academy of Sciences of Armenia, “Ecology of Lake Sevan during the period of Water Level Raise” , The Results of Armenian-Russian Biological Expedition for Hydroecological Survey of Lake Sevan (Armenia) (2005-2009), Makhachkala, Nauka, 2010.
41. Rafael Hovhannisyan and Bardukh Gabrielyan, “Ecological problems associated with biological resource use of lake Sevan, Armenia”, Ecological Engineering 16 (2000) 175-180.
42. Renee A. Irvin and John Stansbory, “Citizen Participation in Decision-Making: Is It Worth The Effort?”, Public Administration Review, 2004, Vol. 64, No. 1.
43. Republic of Armenia, “Second National Environmental Action Program”, UNDP, 2008
44. R. Ison, 2008, Systems Thinking and Practice for Action Research, in P. Reason and H. Bradbury (eds.), The SAGE Handbook of Action Research: Participative inquiry and practice. London. SAGE Publications. Pp. 139-158.
45. Rosemary F James and Russell K Blamey, “Public Participation in Environmental Decision-Making – Rhetoric to Reality?”, 1999 International Symposium on Society and Resource Management, 1999, Brisbane.
46. Ross Pirizzia, “Community Involvement in Protecting the Environment: The Role of Restoration Advisory Boards (RABs)”, The Innovation Journal: The Public Sector Innovation Journal, Vol. 10 (1), 2005.
47. Robert Chambers, Whose Reality Counts? Putting the first last, Intermediate Technology Publications, 1997, London.
48. Shilp Verma, “IWRM Challenges in Developing Countries: Lessons from India and elsewhere”, IWMI, Water Policy Briefing, Issue 24, 2007.
49. Sherry R. Arnstein, “A Ladder of Citizen Participation”, AIP Journal, 1969.
50. Smith, Patrick D. and McDonough, Maureen H.(2001) 'Beyond Public Participation: Fairness in Natural Resource Decision Making', Society & Natural Resources, 14: 3, 239 — 249.
51. Shui Yan Tang, “Institutional Arrangements and the Management of Common-Pool Resources”, Public Administration Review, Vol. 51, No. 1, 1991, pp. 42-51.
52. Scott Goldsmith, “The Alaska Permanent Fund Dividend Program”, Presented at the Conference on Alberta: Government Policies in a Surplus Economy, 2001, University of Alberta, Edmonton, Alberta
53. Sokolov, Vadim (2006) 'Experiences with IWRM in the Central Asia and Caucasus Regions', Water International, 31: 1, 59 — 70,

54. SLIM Framework, “Social Learning as a Policy Approach for Sustainable Use of Water”, A field-tested framework for observing, reflecting, enabling, 2004. Was accessed on-line: http://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxzbGltc29jaWFsbGVhcm5pbmdmb3Jpd218Z3g6MzIyZTFhYzE0NTM0Mzhl , 26.05.2011.
55. Turton et al, 2007 in N. Funke et al., “IWRM in developing countries: Lessons from the Mhlatuze Catchment in South Africa”, Physics and Chemistry of the Earth 32 (2007) 1237-1245, Elsevier.
56. V. Sargsyan, “Lake Sevan in Armenia” , Socioeconomic Analysis for Secure Development Policies, in I. Linkov et al. (eds.), Environmental Security in Harbors and Coastal Areas, 439-449, 2007, Springer.
57. www.osce.org, official web-site.
58. www.unecce.org, official web-site

Appendix 1

Milestones for each of the stages of Soft Systems Methodology

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7
The problem situation unstructured	The situation analysed	Relevant Systems and Root definitions	Conceptual Model	Comparison of 4 with 2	Debate on feasible and desirable changes	Implement changes
Stakeholder analysis Administrative arrangements –getting contacts of stakeholders Make appointments Read relevant documentation Handle interviews Search additional relevant stakeholders through the key ones Handle additional interviews Transcribe interviews after completing each one Keep the records of reflections	Put all information gained through interviews into one picture called "Rich picture" If necessary handle more interviews for clarification Update the "Rich Picture" The analysis made my analyst to see some general patterns in depicted information Identification of basic issues (issue-based) Identification of the nature of essential tasks (Primary task) Information presented to the stakeholders-Rich Picture, Timeline etc. "Working Group" formed Keep the records of reflections	Naming Relevant Systems (issue based and/or Primary task) Describing the system precisely in words- Root Definitions , CATWOE Discussions with the working group (may be done individually) The Statement that defines the Relevant System produced Keep the records of reflections	Deriving an activity model – development of the Conceptual Model Discussions with working group (may be done individually) Further related reading Development of activities that form a model and specifying *what* logically must go on in the system Keep the records of reflections	By asking question CM and RP are compared and similarities and differences found Drawing up an Agenda for further debate Keep the records of reflections	Arrange meeting with the Working Group Use Agenda as the source of debate Put to participants of the meeting some ideas about possible changes in the problem Situation Try to identify those ideas that are agreed by the actors to be *both systemically desirable and culturally feasible* Keep the records of reflections	Action Plan developed and presented for implementation

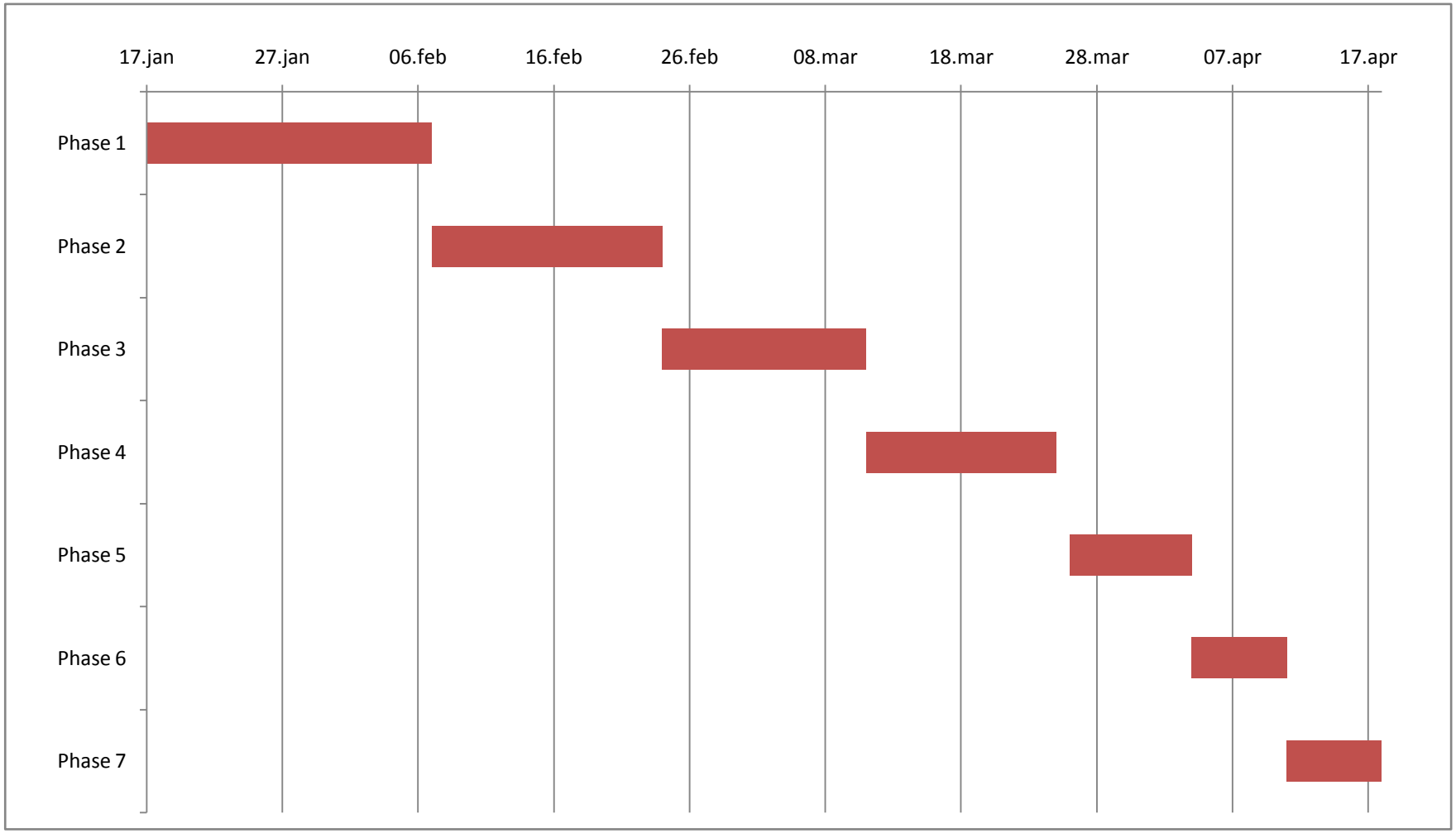
Appendix 2

SWOT Analysis of the Research Project

Strengths • Familiarity with the culture • Knowing the language • Knowing some stakeholders • More opportunities to get the contacts of relevant stakeholders • Previous work in the field • Application of the "new" thinking • Credibility coming also from SLU • Providing time, efforts, money etc to the research for the stakeholders, that is absolutely free for them • Having knowledge and ideas	**Weaknesses** • Ability to speak for different kinds of people • Ability to convince • Self-assurance • Afraid to be mistaken • More communication skills
Opportunities • Studying the situation from a new angle • Building more cooperation • Integration of various stakeholders • Changing the situation • Improving the situation • Introducing Soft Systems Thinking and SSM to Armenia • Improvement of IWRM practices	**Threats** • Difficulty in gathering people for the meetings • Stakeholder's willingness to spend time on my project • Will people in the situation be ready to accept the shift in thinking?

Appendix 3

Gantt chart of the Research Project



Appendix 4

Mini risk method

Risk	Likelihood 1 to 5	Consequence 1 to 5	Risk Value	Action
Difficulty in gathering people for the meetings	4	5	20	Have in mind alternative strategy to continue the work
Stakeholder's willingness to spend time on my project	4	5	20	Have in mind alternative strategy to continue the work
Will people in the situation be ready to accept the shift in thinking?	3	4	12	The situation has to be given a try to figure out the extent of its acceptability
Ability to speak for different kinds of people	2	3	6	Try to overcome by working on that and paying more attention
Ability to convince	3	3	9	Try to overcome by working on that and paying more attention
Self-assurance	2	2	4	Try to overcome by working on that and paying more attention
Afraid to be mistaken	3	4	12	Try to overcome by working on that and paying more attention
More communication skills	3	3	9	Develop communication skills through experience

Photos from the first meeting with the society

Photo 1. First meeting with local society.

Photo 2. Pictures from the first meeting, discussion of Venn diagram

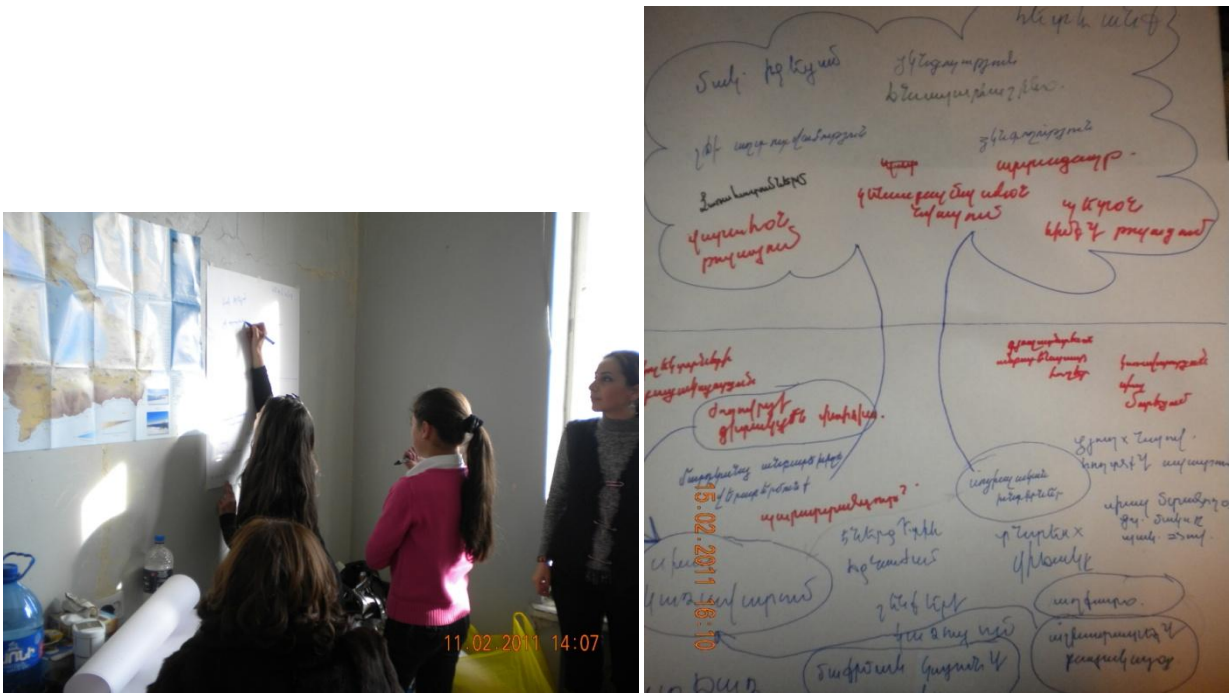


Photo 3. Development of the Problem Tree.

Photo 4. Questionnaire filling after the discussion

Appendix 6

Photos from the second workshop with key stakeholders

Photo 5. Discussions by the involvement of participants

Appendix 7.

Comparison table 'to raise the quality of participation' systems

N	Activity	Present in reality	Comment	Way activity is done	Measure of success of activity	Desirability Feasibility	Justification
Decentralizing							
1.	Updating existing legislation	Somehow	In a very initial stages	There is some created basis	Decrease of the central dictation	No	Decentralization should not be general, it should be elaborated. It is necessary to increase the role of the communities but not every issue should be managed in a decentralized way.
2.	Creating or empowering the responsible institution(s)	Somehow	In a very initial stages	There is some created basis	Decrease of the central dictation	No	
3.	Capacity building (training staff)	Somehow	In a very initial stages	There is some created basis	Decrease of the central dictation	No	
4.	Decentralizing responsibilities	Somehow	In a very initial stages	This is not done yet	Decrease of the central dictation	No	
5.	Create platform for public participation	Somehow	In a very initial stages	This is not done yet	Decrease of the central dictation	No	
Communicating							
1.	Search advanced ways for public participation	No	It is necessary to search the appropriate ways to inform the public	Involving Gavar Aarhus Center	Acceptance from society	Yes	Every community has its own culture and socio-economic condition. All this has to be taken into account and consultations are needed.
2.	Handle public dialogs	No	It is necessary to search the appropriate ways to inform the public	Through Gavar Aarhus Center in cooperation with specialists	Established public dialogs	Yes	Public dialogs can provide two way communication
3.	Researching and facilitating appropriate means for public involvement	No	Research and facilitation should be a continuous process	Through Research institutions	Integration of viewpoints	Yes	Research Institutions have capacities to handle that work
4.	Application of desired and foreseeable PP methods	No	Society has to decide which methods are more acceptable for them	Through government involvement	Higher quality and level of participation	Yes	For two way communication
5.	Establish platforms for communication and collaboration- Advisory Boards, Citizen Advisory Team	Yes	Aarhus centers are established and are aimed for this purpose	Aarhus centers are aimed for disseminating environmental information and public participation	Higher communication and coordination	Yes	Aarhus centers can be that plat forms, the role and importance of Aarhus centers should be increased

6.	Drafting new public laws	No	Through government involvement	Through government involvement	Legal basis for actions	Yes	State commitment is needed
7.	Review of collaborative experiences	No	Through Research institutions	Through Research institutions	Less errors and mistakes	Yes	Research Institutions have capacities to handle that work
Regain natural entitlement							
1.	Financial motivation tools	No	Very little			Yes	Financial motivation interests everybody in every social condition
2.	Creating "Community Funds"	No	"Community" notion did not work in socialism			Yes	The idea is desirable, but the format should be changed from being "community fund" into the "civil fund" where each person would have stake
3.	Establish "Community Dividend"	No	"Civil Dividend" should be formed instead			Yes	It was to be changed into "Civil Dividend"
4.	State ownership over NR	Yes	By Constitution	By law natural resources are state property	Accountable management	No	State acts as owner, not as a manager, should be involved in further debate but in a changes format
5.	Legislature has the authority	Yes	Through adopted legislation	Through adopted legislation	Accountable management	No	By the change in constitution the authority has to be give to the "Civil Fund", should be involved in further debate but in a changes format
6.	Further researching	No	Considering the vagueness of the idea			Yes	Continuous research will provide adaptation
7.	Changing legislation	No	Changed and even new legislative basis			Yes	Change in constitution needed
8.	Studying economic, social and political effects	No	"Civil fund" will have serious effects and those effects must be studied.			Yes	"Civil fund" will have serious effects and those effects must be studied.
Empowering							
1.	Awareness raising (national programs, campaigns, involvement of Gavar Aarhus center, NGOs)	Yes	Explanation works must be carried out instead	Awareness level is convenient	Acceptance	No	Explanatory works can be handled by the Team of Professionals and thus not expecting that those works may be productive, should be involved in further debate but in a changes format
2.	Educating (new approaches, educational reforms)	Yes	Explanation works must be carried out instead	Awareness level is convenient	Acceptance	No	
Coordinating body							
1.	Create political action group	No	Team of Professionals can be formed instead			No	To handle coordinating and explanatory works, should be involved in further debate but in a changes format
Researching							
1.	Research intended actions	No	Deeper researching			Yes	Will assist the process

Appendix 8.

Action Plan 'to raise the quality of participation' systems

N	What Action?	By Whom?	How?	When?	What Resources?	With Whose Collaboration?
Communicating						
1.	Search advanced ways for public participation	Gavar Aarhus Center	Facilitating and consulting stakeholders	LT	Human resources Financial resources	Specialists, Residents, Interested parties and Ministry of Nature Protection
2.	Handle public dialogs	Gavar Aarhus center in cooperation with specialists	Organizing and providing platform for communication	LT	Human resources Financial resources	Specialists, Residents, Interested parties and Ministry of Nature Protection
3.	Researching and facilitating appropriate means for public involvement	Research Institutions	Conducting research and facilitate learning from the community	LT	Human resources Financial resources	Specialists, Residents, Interested parties and Ministry of Nature Protection
4.	Application of desired and foreseeable PP methods	Government Involvement	Citizen juries Citizen panels Citizen dialogs Scenario workshops Deliberative polls	LT	Human resources Financial resources	Ministry of Nature Protection
5.	Establish platforms for communication	Gavar Aarhus Center	Enhance the capacities of Aarhus centers	LT	Human resources Financial resources	Ministry of Nature Protection
6.	Drafting new public laws	Government Involvement	Initiate and draft public laws to create and fund paradigm shift in the process of public involvement	ST	Human resources Financial resources	Ministry of Nature Protection, Government of RA
7.	Review of collaborative experiences	Research Institutions	Research other collaborative experiences that have worked in other countries	ST	Human resources Financial resources	Ministry of Nature Protection
Regain natural entitlement						
1.	Financial motivation tools	Local stakeholders	Creation of Civil Divident	LT	Human resources Financial resources	Government of RA
2.	Creating "Civil Funds"	Local Stakeholders	Payments from resource use are collected into the savings account to form a "Civil Fund"	LT	Human resources Financial resources	Government of RA
3.	Establish "Civil Dividend"	Local Stakeholders	"Civil Dividend" is calculated as half of the earnings of the "Civil	LT	Human resources Financial resources	Government of RA

			Fund" averaged over the preceding five years dividend by the number of eligible residents			
4.	"Civil Fund" ownership over NR	"Civil Fund"	Ownership rights over natural resources belong to the "Civil Fund"	LT	Human resources Financial resources	Government of RA, Local Stakeholders
5.	"Civil Fund" has the authority	"Civil Fund"	The authority of any decision regarding to "Civil Fund" belongs to the Fund itself.	LT	Human resources Financial resources	Government of RA, Local Stakeholders
6.	Further researching	Research Institutions	Research is conducted by the research institutions and specialists	LT	Human resources Financial resources	Ministry of Nature Protection
7.	Changing legislation	Government, "Civil Fund"	Changes in Constitution will be made to establish and give the "Civil Fund" the authority	ST	Human resources Financial resources	Local Stakeholders
8.	Studying economic, social and political effects	Research Institutions	Continuous researching	LT	Human resources Financial resources	Ministry of Nature Protection
Empowering						
1.	Carrying explanatory works	Team of Professionals	Team of Professionals conducts explanatory works thus not expecting that the outcomes will be positive	LT	Human resources Financial resources	Gavar Aarhus Center
Coordinating body						
1.	Creating a Professional Team	"Civil Fund"	A group of professionals should be formed to conduct explanatory and coordinating works	LT	Human resources Financial resources	Local Stakeholders
Researching						
1.	Research intended actions	Research Institutions	Conducting prior and proceeding research in Sevan basin	LT	Human resources Financial resources	Ministry of Nature Protection

Comparison Table 'reducing Illegal fishing' system

N	Activity	Present in reality	Comment	Way activity is done	Measure of success of activity	Desirability Feasibility	Justification
Reforming institutions							
1.	Improving levels of operation	Yes	Is the work of Inspectorate and inspectors of National Park	Corrupted	Reduced Illegal Fishing	Yes	Reduced Illegal Fishing
2.	Setting appropriate sanctions	Yes	Not effective	Penalty Withdrawal		No	In social bad condition this will not make sense
3.	Changing the law on "Fish lincensing"	NO	Completely wrong law	Some initial thoughts but not precise actions	The license should belong only to Sevan national Park, fishermen should be hired by National Park by temporary contracts	Yes	Because of so many people having licenses to fish, the management has become too complicated and almost unmanageable.
4.	Introducing ban for 3 years	Yes	It's too late. Almost no fish in the lake	There is a ban for some species of fish in the lake	More fish in the lake	Yes	The ban should be installed for longer period
5.	Educational reforms in schools	Yes	This theme would be included in the studies of jurisprudence	The studies of jurisprudence exist now	More knowledge on the issue	Yes	The change should be only local in that specific region, should not have a general form
6.	Law enforcement and compliance measures	No	Bad social condition hinder this action			No	Will be feasible after improved social conditions
7.	Forbidding the use of small weaved fish nets	No	The size of the holes and caught fish is not controlled, which has serious effects on the reproduction cycles	The size of the holes and caught fish is not controlled, which has serious effects on the reproduction cycles		Yes	The size of the holes should decide the National Park
8.	Increase capacities of environmental inspectors in the region	No	The capacities are limited	Limited capacities handle their works appropriately	Improved operations	Yes	Salary increase, Increase technical capacities
Economic and Industrial development							

1.	Changing management regimes	No	No need to change			No	
2.	Attract investments through changes in fiscal rules	No	This activity is vital for the region			Yes	Investments will develop the region
3.	Apply attractive tax measures	No				Yes	Improve social conditions
4.	Promote the development of small and medium enterprises	Yes	Partly			Yes	Creating affordable environment and providing privileges will assist the development of the region and thus reduce social bad conditions
5.	Availability of farming credits	Yes	Partly, they are available with high interest rates			Yes	The poorest villagers should be able to have this credits and those credits should be long term
Social development							
1.	Changes in poor social conditions	No	Former industrial enterprises can start operating			Yes	Former industrial enterprises can start operating
2.	Provide knowledge on the problem	Yes				No	Knowledge exists but money is needed
3.	Educational campaigns and programs	Yes	Fragmented			No	Knowledge exists but money is needed
4.	New educational programs in schools	No				No	Knowledge exists but money is needed
Agricultural development							
1.	Achieving improved agricultural production	Yes	Partly	Not effective	Higher productivity	Yes	Agro-industrial measures should be applied
2.	Increased use of improved agricultural l technologies	Yes	Not enough			Yes	Not proper management,
3.	Rehabilitation of irrigation systems	Yes	Not enough			Yes	Absence of pipelines, using “drop” irrigating practices
4.	Access to output markets	Yes	Partly			Yes	People’s work disappears when yield gets rotten, state should buy from residents

							and store
5.	Access to rural finance	Yes	Partly	In a form of projects		Yes	State projects and low interest rates credits
6.	Access to agricultural information and extension services	Yes	Not enough	Agro-information centers in the regions		Yes	Is the responsibility of agro-information centers, increase of capacity is needed
7.	Improved legal framework	Yes	Is in dynamic	Legislation is continuously being improved		Yes	Adaptation measures
Restoring							
1.	Restoring former fishing ponds	Yes	Some work	Some work		Yes	Those fishing ponds can supply small fish in to the lake Will contribute to the restoration of fish quantity in the lake
2.	Create state policy towards the privatized fish ponds restoration	No				Yes	Low interest rates credits are needed
3.	Financing, organizing and planning the operation of fish ponds	No				Yes	State commitment is needed
Working Group							
1.	Establish a working group for initiating, coordination and reporting	Yes	The task can be handled by the Agency of Bioresources			Yes	The Agency of Bioresources has the capacity to handle this works through state projects or state funding.

Action Plan to 'reducing Illegal Fishing' system

N	What Action?	By Whom?	How?	When?	What Resources?	With Whose Collaboration?
Reforming institutions						
1.	Improving levels of operation	Environmental Inspectors	By complying and enforcing the laws	LT	Human resources	Government of RA
2.	Changing the law on "Fish lincensing"	Ministry of Nature Protection	Creating other legislative basis for better management	ST	Human resources	Government of RA
3.	Introducing ban for more than 3 years	Ministry of Nature Protection	Adopting appropriate policy and creating appropriate laws	ST	Human resources	Government of RA
4.	Educational reforms in schools	Ministry of Education	Include in the class of jurisprudence	LT	Human resources	Government of RA
5.	Forbidding the use of small weaved fish nets	Ministry of Nature Protection	Introducing a ban	LT	Human resources	Government of RA
6.	Increase capacities of environmental inspectors in the region	Ministry of Nature Protection	Increase salaries, Supply with appropriate equipments, provide with boats etc.	LT	Human resources, Financial resources	Government of RA
Economic and Industrial Development						
1.	Attract investments through changes in fiscal rules	Government of RA	Creating affordable environment	LT	Human resources, Financial resources	Ministry of Economy
2.	Apply attractive tax measures	Government of Ra	Reducing or cutting short, eliminating taxes in the region	LT	Human resources, Financial resources	Ministry of Economy
3.	Promote the development of small and medium enterprises	Government of RA	Creating affordable environment, providing privileges	LT	Human resources, Financial resources	Ministry of Economy
4.	Availability of farming credits	Government of RA	Providing farming credits with low interest rates that would be accessible for even the very poor farmers	LT	Human resources, Financial resources	Ministry of Economy
Social Development						
1.	Changes in poor social conditions	Government of RA	Former industrial enterprises can start operating	LT	Human resources, Financial resources	Government of RA
Agricultural Development						
1.	Achieving improved agricultural production	Ministry of Agriculture	Agro-industrial measures should be applied	LT	Human resources, Financial resources	Ministry of Finance

2.	Increased use of improved agricultural l technologies	Ministry of Agriculture	Proper management of existing technologies and introduction of new ones	LT	Human resources, Financial resources	Ministry of Finance
3.	Rehabilitation of irrigation systems	Ministry of Agriculture	Rehabilitation of pipelines, using appropriate irrigation practices such as “drop” irrigation etc.	LT	Human resources, Financial resources	Ministry of Finance
4.	Access to output markets	Ministry of Agriculture	State should buy from local farmers and store the yield in the storages or refrigerators	LT	Human resources, Financial resources	Ministry of Trade
5.	Access to rural finance	Ministry of Agriculture	State projects and low interest rates credits	LT	Human resources, Financial resources	Ministry of Finance
6.	Access to agricultural information and extension services	Ministry of Agriculture	Increase of the capacity of agro-information centers	LT	Human resources, Financial resources	Local governments
7.	Improved legal framework		Adaptation measures	LT	Human resources, Financial resources	Local governments
Restoring						
1.	Restoring former fishing ponds	Ministry of Nature Protection	Creating favorable environment for the rehabilitation of fishing ponds that supply small fish in to the lake	LT	Human resources, Financial resources	Local governments
2.	Create state policy towards the privatized fish ponds restoration	Ministry of Nature Protection	Provide low interest rates credits, by providing favorable environment introduce sanctions for not operation	LT	Human resources, Financial resources	Local governments
3.	Financing, organizing and planning the operation of fish ponds	Ministry of Nature Protection	State commitment is needed	LT	Human resources, Financial resources	Local governments
Working Group						
1.	Establish a working group for initiating, coordination and reporting	Ministry of Nature Protection	The Agency of Bioresources has the capacity to handle this works through state projects or state funding.	LT	Human resources, Financial resources	Ministry of Nature Protection

Appendix 12

A compilation of actions made in Armenia according to Aarhus Convention*

N	Action	Year
1.	Convention on Access to Information, Public Participation in Decision-Making, and Access to Justice in Environmental matters (Aarhus Convention)	Signed: 1998 Ratified: 2001
2.	RoA MNP has established Environmental Information Centers	2002
3.	RoA Government Decision "On Procedure for Public Notice and Publicity of Documentation Drafted by the Water Resources Management Authority"	Passed: 07.03.2003 N217-N
4.	RoA Government Decision "On Procedure for Provision of Information on Transboundary Water Resources"	Passed: 08.05.2003 N612-N
5.	RoA Government Decision "On Procedures for Recording of Documents in the State Water Cadastre and provision of Information"	Passed: 23.03.2003 N060-N
6.	Program on "Ecological Information, education and public notice in Armenia, Azerbaijan, Belarus, Georgia, Moldova, Ukrain" (funded by TACIS)	2002-2004
7.	Program on "Investigation of the realization of human rights in Armenia"	2009
8.	Creation of official web-page of Aarhus Convention	
9.	Brochure of "Ecological Right"	2010
10.	Third National Report	2010
11.	The establishment of Working Group to assist the implementation of the provisions of Convention	2006

*the table may not contain complete information regarding the actions introduces towards implementation of Aarhus Convention.